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A Delicate Balance:
Protecting the Environment and Strengthening Trade Through Controlling Aircraft Noise and Emissions

By Linda Louise Richardson

B.A.A.S., May 1983, University of Delaware
J.D., May 1986, University of Maryland School of Law

A Thesis submitted to

The Faculty of

The George Washington University
Law School
in partial satisfaction of the requirements
for the degree of Master of Laws

August 31, 2001

Thesis directed by
Laurent R. Hourcle
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TABLE OF CONTENTS

(continued next page)

TABLE OF CONTENTS (cont.)

INTRODUCTION

International trade and environmental law present a difficult and delicate balance for the commercial airline industry. The weight of real-world trade and environmental issues constantly shift the balance in opposing regulatory and normative directions.

For instance, the environmental realities of running an airport, ranging from noise control and air emissions to less publicized issues of chemical runoff and waste disposal, foment anti-airport sentiment in the public and impose significant fiscal burdens on the airport itself. Despite that, the speed and convenience of air travel and the cheaper ticket prices brought by deregulation has the same public clamoring for more flights to more places at more times of the day and night.

From a trade perspective, many nations want to tightly control how much air traffic passes through their countries and which airlines carry that traffic. For those countries, making issues of environmental concerns and requesting fuel taxes or other recompense may actually be a mask used to protect their national flag carriers from competition with foreign airlines.

Industry practices also add tension to the delicate balance between environmental goals, international trade policies and the (western) paragon of efficient competition. For instance, two current practices in the industry exacerbate environmental problems of noise and air emissions. Hubbing (namely, routing passenger traffic through a major city rather than flying directly non-stop to a destination) often forces passengers to travel more air miles, and causes aircraft to burn more fuel, than if flying by the most direct route.

Hubbing also increases the number of take-offs and landings required to transport passengers to their destination. Noise and emissions often are at their peaks during take offs and landings. Consequently, hubbing increases fuel consumption, air and noise pollution.

Similarly, the industry practice of flying aircraft with less than a full capacity of passengers in order to meet consumer demand for around-the-clock flights to often-unprofitable destinations can waste fuel and increase pollution.

Finally, variations in national regulatory practices, notably the variation between the United States' "Open Skies" policy of deregulation and the much stricter and more protectionist policies of some Asian, Latin American and even Western European countries, makes efficient competition even tougher to achieve.

The International Civil Aviation Organization (hereinafter ICAO), formed by the 1944 Convention on International Civil Aviation (commonly known as the Chicago Convention)[1] has tried to address the burdens that environmental issues impose on the commercial airlines industry by environmental issues.

For instance, by its rule-making authority, the ICAO has developed Annex 16. Annex 16 provides graduated standards for noise control and oxides of nitrogen (hereinafter NO_x) emissions. The Chicago Convention also includes a basic prohibition against trade protectionism in its non-discrimination principle and international recognition of air-worthiness certificates. However, the ICAO has not been effective in addressing trade issues. Instead, politics and partiality have hamstrung the ICAO.

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[1] Agreement on International Air Services Transit, Dec. 7, 1944, Art. I, 84 U.N.T.S. 389, 390 (hereinafter Chicago Convention).

This paper first examines the environmental side of the airline industry by presenting and overview of the present regulatory regimes of pollution control. From this overview, this paper highlights the dichotomy between the United States "Open Skies" policy and the more protectionist policies adopted by other nations. An argument is proffered that this dichotomy undermines international efforts towards pollution control. Finally, this paper proposes a new treaty regime, one that will incorporate both freer trade and environmental controls, should replace or supplement the Chicago Convention.

There are several default policy premises that underlie the arguments presented in this paper. For the sake of simplicity, these premises are assumed to be desirable for the international airline market and for society as a whole.

First, competition between international carriers benefits society, and is therefore desirable. Second, increased air travel is inevitable, therefore the benefits of creating an international regulatory regime that controls noise and air emissions but may coincidentally promote the growth of the airline industry outweighs the drawbacks of any consequential increase in air travel. Third, although this paper suggests amending treaty law for regulating the airline industry, it does not imply that national regulation of domestic airline industries is undesirable.

Structurally, this paper is subdivided into nine sections that discuss the substantive issues of international noise pollution and aircraft emissions law, the shortcomings thereof (particularly of the Chicago Convention), and what elements should be incorporated in revising treaty law to address these shortcomings. The nine sections of the paper are:

I. The Airline Industry;

II. Noise Pollution;

III. U.S. Controls on Noise Pollution;

IV. ICAO History and Structure;

V. The Hushkit Controversy Between U.S. and Fifteen European Union (hereinafter EU) Nations;

VI. Future of Noise Control;

VII. NO_x Control and Greenhouse Gas Issues;

VIII. Desired Features in Institutions of Global Environmental Governance;

IX. Proposals for New or Revised Aviation Treaties.

Part one examines factors peculiar to the airline industry such as rapid growth, inadequate infrastructure, funding, financial and marketing issues and how such issues create difficulties in pollution control. Part one further discusses what kinds of pollution problems plague the industry. It reviews the political and legal pressures on airport proprietors and the role airports play in urban growth and development. The high fixed costs imposed on the airlines are considered. It discusses how airline deregulation has not led to the predicted increase in industry productivity. Finally, part one summarizes the role fuel pricing plays in airline economics.

Part two of this paper looks at noise pollution in general, summarizing what noise is from a scientific and policy perspective and how noise is measured and controlled. Part two also discusses how noise may adversely affect humans.

Part three of this paper discusses the limitations of current remedies to control noise pollution within the United States. It further discusses the proposals of several authors on how to improve noise control on a national level. Part three looks at the role federal planning plays in noise regulation. Finally, part three examines why the U.S. military, which has often taken the lead in aeronautical technology, has thus far failed to take the lead in aircraft noise control.

Part four of this paper provides an overview of the history and structure of the ICAO. It discusses the ICAO's specialized role as one of the few international institutions with rule-making authority and the only international institution with regulatory power over commercial aviation. It summarizes how that power has developed over the past half century. Finally, part four looks at current ICAO standards set forth in Annex 16 of the Chicago Convention.

Part five looks at a current conflict between the fifteen EU nations and the United States over hushkits, a mechanism which modifies older aircraft engines to make them less noisy. It considers arguments both in favor of the United States and in favor of the EU nations, and analyzes the arguments under applicable principles of international law. Part five concludes by differentiating between what might be the optimal result from a legal perspective and what is the optimal result from a policy perspective.

Part six looks at the future of noise control law and arguments as to whether the current legal regimes are conducive for encouraging future improvements in noise-control technology. It looks at the initiative for the next level of noise control and whether the industry is ready for even stricter control. Part six concludes with an

argument that the U.S. military may play a role in the technological development of noise pollution control equipment.

Part seven looks to the future of noise control by assessing modern aircraft's impact on air pollution, particularly greenhouse gas emissions. It looks at some of the science and the policy issues implicated in trying to address greenhouse emissions control. It analyzes current U.S. emissions regulations and considers recommendations from the International Panel on Climate Change's Special Report on Aviation and the Global Atmosphere. Part seven concludes by arguing that despite problems of scientific uncertainty, the increasing popularity of air travel requires a hard look at whether current controls are sufficient.

Part eight examines what suitable attributes are found in an institution regulating environmental issues in the international arena. It reviews how international law is developed and considers scholarly arguments favoring creation of an empowered international institution with environmental responsibilities.

Part nine examines arguments in favor of changes to the Chicago Convention. It asks what trade policies should be embraced for formulating aviation treaties to balance sound economic growth, sustainable transport and environmental protection while safeguarding such traditional concerns of the industry such as protecting a sovereign nation's interest in the airline's role in national defense. Part nine concludes with the argument that the Unites States must articulate its own policy on trade, social change and national defense in order to assess how to balance trade and environmental issues.

The paper concludes that the ICAO is institutionally ill equipped to handle the multitude of political and legal issues swaying the delicate balance for environmental and

trade issues. Its origin and mission were, and still are, geared towards promotion of the aviation industry. The ICAO promotes aviation through facilitating common international standards of safety and technical practices, and by providing support for mutually beneficial extensions of the right to air passage between nations.

Thus the ICAO is, in effect, more of a "cheerleader" for the airline industry than a regulatory "policeman." Nonetheless, ICAO is the only international institution broadly empowered with rule-making authority for key issues related to air travel. Therefore this paper generally concludes that the ICAO is best suited to regulate trade and environment issues through its authority under the Chicago Convention.

This paper, however, proposes that the current convention be modified so that there is a clearer commitment to the balance of trade and environmental issues, a commitment to GATT-friendly multilateral aviation rights and better dispute settlement authority.

I. THE AIRLINE INDUSTRY

A. Pollution

Airplanes and airports pollute the environment in a number of ways. Airports and aircraft are a significant source of air pollution due to carbon dioxide (hereinafter CO_2), volatile organic compounds (hereinafter VOCs) and NO_x emissions. Similarly, airports and aircraft are a source of land and water pollution due to the toxic antifreeze and de-

icing chemicals seepage into land, groundwater and surface runoff.[2] CO_2 and NO_x are probably the most significant air pollutants emitted by aircraft.

However, scientists have not been able to accurately measure exactly how much pollution a typical commercial aircraft actually emits in flight.[3] The National Aeronautics and Science Administration (hereinafter NASA) has been studying the problem of accurately quantifying aircraft emissions but has made only a few statistically significant measurements.[4]

While the industry has made improvements in controlling aircraft emissions[5], significant pollutant emissions problems persist. This is especially true in urban areas where aircraft emissions add to the emissions of attendant ground transportation vehicles causing major VOC and NO_x pollution problems.[6] Moreover, aviation has the highest per person-kilometer contribution of carbon dioxide when compared to automobiles, busses and trains.[7]

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[2] See generally David Holtzman, Plane Pollution, Environmental Health Perspectives, Volume 105, Number 12, December 1997, available at <http://ehpnet1.niehs.nih.gov/qa/105-12focus/focus.html>, Visited Jan. 2, 2001.

[3] Pernille Tranberg, Measuring Airplane Pollution, The Earth Times, May 11, 1997, available at <http://rossby.metr.ou.edu/-spark/AMN/v1_n3/news/Pollution.html>, visited Dec. 30, 2000.

[4] Don Nolan Proxmire & Catherine E. Watson, Jet Aircraft: How Large A Source of Atmospheric Pollution?, NASA Headquarters Public Affairs Office, Feb. 15, 1996, available at <http:///wwww.qadas.com/qadas/nasa/nasa-hm/0392.html>, visited Jan. 2, 2001.

[5] See, e.g., Air Transport Action Group, International Air Transport Association, Air Transport and the Environment, available at <http://www.atag.org/atenv/>, visited Jan. 2, 2001 (arguing that aviation consumes just 5% of the annual world oil consumption; generates 2-3% of global NO_x and CO_2, but that jet engines built after 1982 emit 85% less unburned hydrocarbons and 70% less carbon monoxide than jet engines built in the 1970's). This industry lobbying group, however, does not offer statistics on how many such pre-1982 aircraft are still in use.

[6] Holzman, supra note 2 at 5 (noting that in 1993 aircraft emitted 350 million pounds of VOC's and NO_x during take-off and landing cycles, more than double the 1970 levels, and that John F. Kennedy airport is the second largest source of VOC's in New York City).

[7] See generally Martin Hindley, Emission Control, Flight Int'l, Jan. 31, 1996.

B. Growth

Air travel and shipping have grown at astronomical rates, having more than doubled between 1970 and 1990, and are expected to double again over the next decade or so.[8] Some commentators have attributed the doubling of air passenger traffic in the United States to deregulation.[9] Other writers have noted that most of the future growth is expected to be generated from increased traffic to and from currently less developed countries rather than the United States.[10]

Despite this growth, airlines have faced economic turmoil, and the airline industry has not reaped the profits that would naturally seem to result from such an exponential growth in demand for airport services. As will be discussed below, many airlines did not survive the slowing down of industry growth after 1987, which caused some scholars to question if industry growth has peaked.[11] The Federal Aviation Administration, (hereinafter FAA), however, predicts a nearly 59% increase in passenger air travel from 1999 to 2011.[12] This increased growth will probably exacerbate the ripple effect of delays across the nation's airports.[13]

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[8] See OECD, Pollution Prevention & Control: Environmental Criteria for Sustainable Development 21 (1996) (finding that passenger traffic increased by 260% and cargo by 220%). See also Transport Canada, The Greening of Aviation 11 (1996).

[9] Compare Lyn Loyd Creswell, Airport Policy in the United States: the Need for Accountability, Planning and Leadership, 19 Trans. L. J. 1, 6 (1990) with Paul Stephen Dempsey, Airlines in Turbulence: Strategies for Survival, 23 Trans. L. J. 15, 26 (1995) (arguing that U.S. domestic growth has been flat since 1987, despite self-destructive airline price wars). See also Julius Maluditis, Industry Investment Requirements -- Looking beyond 2000, Address Before the 7th IATA High Level Aviation Symposium Sept. 6-7, 1993, Cairo, Egypt.

[10] Transport Canada, supra note 8. Also consider the difference in population growth-rates between Western Europe, the United Sates and countries in Latin America and Asia.

[11] Julius Maldutis, Why Aren't the Airlines Profitable?, AirLine Pilot, Jan. 1995, at 26-28.

[12] Statement of Gerald L. Dillingham, Air Traffic Control Role of FAA's Modernization Program in Reducing Delays and Congestion, GAO Report GAO-01-725T, May 10, 2001, at 1.

[13] Id. at 1 (noting the national airspace system is facing significant capacity problems; causing one out of every four flights to be cancelled, diverted or delayed and thereby adversely affecting 163 million airline

C. Infrastructure

The FAA has seriously considered the need for improved air travel infrastructure since the 1990s.[14] Current General Accounting Office (hereinafter GAO) reports outline the "increasing gap between the demand for and the capacity of the national airspace system (NAS)."[15] Part of the workload pressures on airport infrastructure is due to the industry practice of scheduling large numbers of flights at peak hours in order to satisfy the public's demands for flights at convenient times. Another part of the workload is probably caused by the current "hub" system of routing flights.

For example, Creswell observes that a typical airport proprietor sits within a web of conflicting interests -- local homeowners demand relief from increased noise and decreased property values caused by the airport, which in turn trigger curfews. Curfews then in turn heighten demand for flights in peak times. This spiral of pressure to at once limit flights and expand flights puts pressure on airport proprietors to resolve land use conflicts despite the proprietor's frequent legal and regulatory inability to do so in an effective manner.[16]

Creswell also notes that the airline industry's increased use of "hubbing" since deregulation has burdened the infrastructure of many major airports.[17] Flights that were formerly on a direct route between cities on an occasional basis are now a more frequent connection passing through a major hub airport.

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passengers).

[14] See Federal Aviation Administration, Aviation System Capacity Annual Report 5 (1993) (discussing that unless infrastructure is improved, delays at the nation's largest airports will cost $1.1 billion by 2001).

[15] Dillingham, supra note 12.

[16] Creswell, supra note 9 at 7-8.

[17] Id. at 19.

Hubbing has not necessarily improved competition in the airline industry. Because the airline industry's ability to expand is partly limited by how much physical infrastructure regional airports can support, there are significant structural barriers to market entry (e.g. lack of airport infrastructure capacity) by new air service providers. A recent GAO report notes this trend with concern, stating:

> Major airlines dominated 16 of the 31 largest U.S. airports (i.e. airlines carried more than 50 percent of the passengers), at which about 260 million passengers traveled in 1999. Moreover these dominant airlines faced relatively little competition; another airline competed (i.e., carried more than 10 percent of the passenger traffic) at only 6 of the 16 dominated large airports. Low-fare airlines such as Air Tran Airlines (Air Tran) competed at just 3 of those 16 airports.[18]

Dempsey observes that since deregulation, dominant airlines control between sixty and ninety percent of the market at seventeen major airports, whereas prior to deregulation, no airline controlled more than fifty percent of the market.[19]

This implies the paradoxical conclusion that deregulation has thwarted, rather than fostered, competition in the commercial airline industry. On the other hand, it also suggests that only large airlines have the assets to withstand "fare wars" at times when the marketplace is most competitive. Unfortunately, when the smaller competitors are squeezed out of the market, the large airlines may then raise fares.

In order to improve competition, infrastructure must improve. According to Creswell, medium-large hub airports will spend about one billion dollars annually on capital expenditures, about half of which is for new infrastructure to increase capacity. With roughly one third coming from federal funds and one tenth from state funds, the

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[18] Jay Etta Z. Hecker, Aviation Competition: Challenges in Enhancing Competition in Dominated Markets, GAO Report GAO/01-518T, March 13, 2001.

[19] Dempsey, supra note 9 at 34.

airport must raise the balance through selling bonds or similar capital financing strategies.[20]

An airport's ability to raise capital depends upon the bond rating awarded by either Standard and Poors or Moody's Investment Service, two well-reputed investment institutions.[21] These investment institutions evaluate the airport's revenue potential, sources of income, demand, and business practices such as historic debt service coverage and future planning.[22] The investment institution also considers other factors not directly tied to the airport itself. For instance, there is a symbiotic relationship between the financial health of an airport and that of the neighboring community.[23]

There is also a symbiotic relationship between the financial health of airports and that of airlines. As noted by Professor Dempsey, much of the needed financial support for building new infrastructure must come from the airlines either in the direct form of charges for gate usage or indirect costs such as taxes and tariffs.[24] Hence airports cannot improve infrastructure unless airlines are financially healthy, but healthy competitive airlines cannot grow without infrastructure.

D. Financial State of the Airlines

Between the general corporate economic slump of the early 1990's and the eight billion dollar losses suffered by the major U.S. airlines during the same time frame, the

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[20] Creswell, supra note 9 at 51.
[21] Id.
[22] Id.
[23] See generally. US Airports Building Their Way Out Of Travel Jams, available at <http://archives.californiaaviation.org/airport/msg10524.html>, visited on Jul. 25, 2001 (discussing the over twenty-five percent growth in air travel at Washington's Dulles International Airport and its link to phenomenal regional growth).

airline industry has suffered serious financial setbacks.[25] To some degree, these losses may be characterized as natural permutations of an efficient marketplace where the strong get stronger and the weak disappear.[26]

For instance, after the wave of mergers and bankruptcies that characterized the airline industry in the early 1990's, Pan Am and TWA, two longstanding carriers were gone and new bargain basement priced carriers such as Southwest and Value Jet emerged.[27] But as discussed previously, there are significant barriers to market entry in the airline industry caused by pervasive lack of infrastructure capacity. Thus new carriers have trouble gaining a corporate foothold in major urban airports.[28]

There is also a shift in domestic passenger travel patterns in the United States. According to Maluditis, this may be due to market saturation, namely, the nation has reached a peak of how many Americans will travel. Maluditis also notes that globalization may be impacting the growth of air travel, in that people are traveling to business meetings across the world. He observes video teleconferencing is being used in lieu of air travel.

Finally, he theorizes that the loss of many middle-management white-collar executive jobs has resulted in fewer business travelers.[29] Hence market saturation and globalization have impacted the growth stability of the airline industry.

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[24] Dempsey, supra note 9 at 21.

[25] See, e.g., Maldutis , supra note 11; BNA, Aviation: Financial Condition of Airline Industry A Major Concern, Daily Rep. For Executives 28 (Feb. 12, 1993).

[26] See e.g., Dempsey, supra note 9 at 41 (describing the great number of mergers and acquisitions).

[27] Lars Gorton, Air Transport and EC Competition Law, 21 Fordham Int'l L.J. 602, 604 (March 1998).

[28] See also Adam L. Schless, Open Skies: Loosening the Protectionist Grip on International Civil Aviation, 8 Emory Int'l L. Rev. 435 (Spring 1994) (noting that industry pioneers such as Pan Am have gone bankrupt, leaving the "Big Three" airlines Delta, United and American and requiring USAir, Northwest and Continental to have to fight to survive).

[29] Maldutis, supra note 11.

This unstable economic situation had a severe impact on the average age of the United States' aircraft fleet from 1987-1997[30] (this will play a role in our discussion of hushkits and international noise control later). Due to the uncertainty of market conditions airlines chose to upgrade older aircraft to meet modern pollution control requirements rather than to purchase a new fleet of aircraft.

For instance, it was common practice for an airline to spend three million dollars to hushkit a twenty-five year old plane instead of thirty-five million dollars to purchase a new aircraft.[31] However, such cost-cutting measures only go so far; it is a well-known economic reality that the airline business is fraught with high fixed costs.[32] Given the high fixed costs of maintaining and operating aircraft, an expensive labor pool, fluctuating fuel costs and the aforementioned market conditions, it is unsurprising to conclude that the airline industry is a risky business with high debt-to equity ratios.[33]

The airline industry is also very sensitive to upswings or downturns in the national economy. A very recent example is how the seemingly bright future for the airlines predicted in the year 2000, rapidly soured in 2001.[34]

E. Deregulation, Flight Routes and Economics

As discussed previously, the Chicago Convention recognizes certain freedoms of flight, but it is fundamentally rooted in the principles that sovereign nations should retain

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[30] Dempsey, supra note 9 at 40 (noting that "inadequate profitability in the 1980's has caused the U.S. fleet to degenerate into the oldest in the developed world").

[31] Id.

[32] Dempsey, supra note 9 at 22.

[33] Id. at 21.

[34] Compare Dan Reed, Airlines Welcome High Demand; Fares Up Planes Full Thanks to Strong Economy, Fort Worth Star-Telegram, July 12, 2000 with Dan Reed, Economic Slowdown Clips Airline Industry's

control over authorizing flights within sovereign airspace. This principle has fostered a tendency for nations to favor "flag carriers" or certain national airlines operating specific scheduled routes.[35]

Most national regulatory systems set tickets at a specific price or tariff, and such tariffs have acted to prevent real domestic competition. Further, this principle of sovereignty has encouraged nations to limited access to their airports, and hence their national markets, except for cases where the host and foreign nation have entered bilateral agreements that explicitly apportion the routes (and thereby the relevant airline passenger and cargo markets) between the two nations.[36]

According to Lehner, two growth factors, the huge increase in passengers and trade liberalization leading to shipment of goods to world markets, have created legal and market pressures for nations to devise new ways of negotiating international routes rights for the airline industry.[37] This pressure is counterbalanced however by the traditional view that national sovereignty over airspace prohibits free multilateral access. Instead, any agreements giving foreign airlines the right to fly particular routes in sovereign airspace must be founded upon bilateral agreements.[38]

Traditional bilateral agreements are largely patterned on "Bermuda 1," a model agreement that the United States and Britain concluded in 1946.[39] Although bilateral agreements are a convenient and nominally efficient means for allocating the airline market between two nations, commentators noted that bilateral agreements have had the

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Wings, Fort Worth Star-Telegram, June 21, 2001.

[35] Gorton, supra note 27.

[36] Id.

[37] Randall D. Lehner, Protectionism, Prestige, and National Security: The Alliance Against Multilateral Trade in International Air Transport, 45 Duke L. J. 436, 439-440 (November 1995).

[38] Id.

[39] Agreement Relating to Air Services, Feb. 11, 1946, U.S.-U.K., 60 Stat.1499 (hereinafter Bermuda I).

overall effect of protecting otherwise inefficient national airlines from competing with other carriers in the global airline market.[40] Some politicians protest that opening up U.S. markets to foreign competition is a mistake because the United States offers the richest air market in the world and would only gain in exchange a limited market found in the airports of other nations.[41] Others are reluctant to make a change from bilateral agreements because they are the most familiar method of agreement and have been used for over fifty years.[42]

Deregulation of the U.S. airline industry has also had a major impact on the international airlines industry. In 1978 Congress passed the Airline Deregulation Act, which heralded the start of the "Open Skies" policy.[43] In 1992, Assistant Secretary of Transportation Jeffrey Shane articulated an expansion of "Open Skies."[44] The expanded policy included eleven provisions that opened up access to markets between the United States and any nation upon signing a new reciprocal agreement that was introduced with the policy.

The provisions of "Open Skies" include: (1) allowing any number of airlines to fly on a given route rather than limiting the number of carriers servicing any pair of linked cities; (2) unrestricted capacity and frequency between any paired cities; and (3)

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[40] See, e.g., Lehner, supra note 37 at 447; Schless, supra note 28 at 451.

[41] Whether International Airline Services Should Be Included In the General Agreement On Tariffs and Trade (GATT): Hearing Before the Subcomm. on Aviation of the House Comm. On the Judiciary, 101st Cong., 1st Sess. 18 (1989) (hereinafter GATT- Airline Hearing) (containing the statement of Rep. James Oberstar, Chairman).

[42] Id. (statement of Richard B. Self, former Deputy Assistant U.S. Trade Representative).

[43] Airline Deregulation Act of 1978, Pub. L. No. 95-504, 92 Stat. 1705 (1978), currently 49 U.S.C. app. 1301 et seq. (1988).

[44] See In the Matter of Defining "Open Skies", Department of Transportation Order No. 92-8-13, 1992 DOT Av. LEXIS 568, 1.

unrestricted route and traffic rights, i.e. carriers may select their points of origin and destination rather then being limited to specific gateway cities.[45]

The new reciprocal agreement also included a ban on unilateral price disapproval, that is, a nation cannot force a carrier to change its set price; instead, all nations who are parties to the agreement must agree.[46] There are provisions to liberalize cargo and charter shipments and allow open code-sharing (which allows a computer reservation system to have shared code numbers from the airlines enabling the ticket purchaser to mix and match flights on one ticket for a cheaper overall price).[47]

Under the new policy, carriers are authorized to perform their own support functions at foreign airports.[48] Finally, there are fair competition rules and an explicit commitment for computer reservation systems to be operated in a manner that is nondiscriminatory.[49]

The Netherlands was the first nation to enter such an Open Skies agreement with the United States.[50]

Some of the international marketing strategies airlines developed in response to the Open Skies deregulation have compounded the airlines' fiscal problems. Dempsey aptly sums up the problem by stating, "The lesson of deregulation – that carriers compete on fares rather than on quality – has an inherent contradiction."[51]

Dempsey finds that the pressure to lower costs for the purpose of competition is countered by the significant marketing costs required to develop and maintain a profitable

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[45] In the Matter of Defining "Open Skies", Department of Transportation Order No. 92-4-53, 57 Fed. Reg. 19, 323 (1992).
[46] Id.
[47] Id.
[48] Id.
[49] Id.
[50] Agreement to Amend the Air Transport Agreement, Oct. 14, 1992, U.S.-Neth., T.I.A.S. No. 11,976

customer base.[52] Ironically, while the Open Skies policy has succeeded in the sense that it has decreased airfares for the public, the resources spent to compete for and maintain customer bases have shaved airline profit margins to the point where fewer airlines exist to engender real competition.

The U.S. Open Skies policy does not go so far as to revoke the Chicago Convention principle of cabotage.[53] In fact, there is still a U.S. law banning foreign carriers from flying purely domestic routes.[54] The Open Skies policy affords foreign carriers much freer access to U.S. air markets than is enjoyed in the reverse, simply due to the size of and number of airports within the United States relative to most other nations. This can be inequitable as the EU has made the European Community a single cabotage area, much to the detriment of non-EU carriers.[55]

Airlines have worked out "end runs" around the cabotage barrier through several methods that distort international competition and undermine the goals of the Open Skies policy. The end runs include code sharing, blocked space arrangements, agreements for computer reservation system access, obtaining partial ownership interests in the foreign airline (usually a European airline obtaining interest in a U.S. carrier) and setting up joint marketing strategies such as frequent flyer programs.[56]

The general effect of these end run tactics is that the U.S. carrier can, by contractual association with a foreign airline, promote its services to a larger customer base (U.S. + foreign market) than the U.S. carrier would otherwise be able to access (U.S.

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[51] Dempsey, supra note 9 at 59.
[52] Id. (citing Douglas Cameron & Phillip Shearman, The Balancing Act, Airline Bus., Jan. 1992, at 14).
[53] Chicago Convention, supra note 1 at Art. 7 (the word "cabotage" originated from the French language, and in the airline industry refers to the common practice of limiting the right to compete for domestic airline business to domestic airlines while excluding foreign airlines).
[54] 49 U.S.C. § 1508(b) (1988).
[55] See e.g., Schless, supra note 28 at 453.

market only). While fiscally logical from a corporate perspective, such tactics offer no incentive for foreign nations to adopt the Open Skies policy.

Furthermore, the tactic of linking domestic and foreign airlines under an ostensibly combined single airline has prompted concern that consumers may be defrauded or prevented from choosing the flights that best suit their needs.[57]

Therefore, domestic carriers attempts to end-run the cabotage policies may not benefit consumer welfare. For the Open Skies policy to be truly successful, it is essential to have multilateral agreements that allow fair competition for all carriers, not just those with foreign partnerships.

It is also essential to equitable balance the burden of environmental compliance. In this vein, Dempsey has argued that ending the United States' Open Skies policy for a more traditional regulated policy will benefit the public. He believes that such a policy shift would increase aircraft load factors, lower per capita fuel consumption and pollution, increase the price of air transport to better reflect the societal burdens of air travel and increase airline profitability to purchase newer more fuel efficient aircraft.[58]

Therefore Professor Dempsey argues that the cost of higher ticket prices under a regulated policy are outweighed by the benefits of less pollution and incentives for the airline industry to purchase more environmentally friendly aircraft.

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[56] Schraft & Rosen, Cabotage or Sabotage?, Airline Pilot, Oct. 1987, at 29.

[57] Susan Carey, Cross-Border Linkups Bring Airlines Range But Uncertain Benefits, Wall St. J., June 7, 1994, at A1.

[58] Paul Stephen Dempsey, Trade and Transport Policy in Inclement Skies -- The Conflict Between Sustainable Air Transportation and Neo-Classical Economics, 65 J. Air L. & Com. 639, 688 (Fall 2000).

F. Fuel Pricing

The price of aviation fuel is a major fixed cost for the airline industry, and one that often makes the difference between an airline being profitable or not profitable. The Persian Gulf conflict, and its attendant political impact on the oil-rich Persian Gulf area in 1990 and the war therein in 1991, did not help the financial state of the airlines. The pressures put on the petroleum industry caused a leap in fuel prices that further narrowed the airlines' slim profitability.[59]

Some scholars call for increased aviation fuel prices to counterbalance the environmental cost air travel imposes upon society.[60] Politicians have taken note of such balancing arguments. For instance, in response to a policy document from the European Commission on Aviation, the European Parliament suggested that environmental levies should be imposed upon airlines if international talks on aviation fuels should fail.[61] The European Union would like to take steps to "internalize" the environmental and infrastructure costs of aviation.[62] Nevertheless, it is evident that domestic and foreign political support is growing for increasing aviation fuel prices to partially offset the environmental harm caused by the airline industry.

The Chicago Convention however, limits a nation from taxing the on-board fuel as it transits through different countries.[63] This policy was reaffirmed by the Council in a 1993 resolution that renewed adherence to the custom of reciprocal exemption from

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[59] Dempsey, supra note 9 at 21.
[60] Dempsey, supra note 58 at 663, 682.
[61] See generally BNA, International Environmental Reporter, Vol. 13, No. 19, at 700 (Sept. 13, 2000).
[62] Id. at 701.
[63] Chicago Convention, supra note 1 at Art. 24.

customs and duties for fuel, so long as that fuel is used for consumption by the aircraft while engaged in international air transport.[64]

Therefore, it is unlikely that the price of fuel could be linked to environmental costs unless there were an amendment to the Convention or a new multilateral treaty.

II. NOISE CONTROL

A. What Is Aircraft Noise?

According to U.S. Fish and Wildlife Service's analysis of various scientific studies, humans perceive sound logarithmically as the eardrum physically reacts to the pressure level created by the fluctuations in atmosphere. [65] That is why sound is measured in logarithmic decibels to reflect the relative loudness.[66] The decibel scale is structured so that an average human ear's threshold of hearing is nominally set as zero.[67]

The pain threshold, namely the sound level at which an average human will experience pain in response to sound wave pressure impinging upon the eardrums, is about 120 decibels.[68] A typical commercial jet aircraft generates about 140 decibels at

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[64] See Heather L. Miller, Civil Aircraft Emissions and International Treaty Law, 63 Journal of Air L. & Com. 697, 712, citing at note 78 ICAO, ICAO's Policies on Taxation in the Field of International Air Transport, 3-4 Doc. No. 8632-C968 (2d ed. Jan. 1994) (approved by the Council on Dec. 14, 1993).

[65] Manci, K.M., D.N. Gladwin, R. Villella & M.G. Cavendish, Effects of Aircraft Noise and Sonic Booms on Domestic Animals and Wildlife: A Literature Synthesis ,U.S. Fish and Wildlife Service National Ecology Research Center, Ft. Collins, CO, NERC-88/29, 1988, at 2.

[66] Id. See also FAA, Aviation Noise Effects Report, ADA 154319, March 1985, at 3 (defining a decibel as "a shorthand way to express the amplitude of sound," and further explaining that because sound can vary from 1 to 100,000 "units" it is not a manageable number for people to understand. Hence, the decibel system compresses those units into nominal numbers ranging from 20 to 120).

[67] Id. at Table 1.

[68] Id.

take-off.[69] Therefore, typical jet aircraft of the airline industry generate sufficient noise to cause pain in humans in the vicinity of the aircraft.

The decibel scale indicates compression of sound pressure, so that the combined noise of two identical jets is only incrementally more than either jet alone.[70] Even with different jets, the addition of the lesser noise is hardly noticeable by the typical human in vicinity of the combined aircraft noise. In such instances, the louder jet overwhelms the senses.[71] Therefore noise generated by commercial jet aircraft at an airport is not cumulative of the number of jets generating noise (provided they are operating at the same time).

Instead, the noise rises to the level of the loudest jet, and additional, but less noisy jets, operating in the same area do not significantly add to the perceived noise level. On the other hand, most airports have a fixed number of runways, and the number of jets that may take-off and land at any given time is limited. So more jets frequently do create more noise annoyance in typical humans because the interruption and discomfort occurs more often.

Besides the sound pressure level, noise also presents a "pitch", which is defined as the distribution of sound pressure as a function of frequency.[72] To measure pitch, a specific time period, usually one second, is used to ascertain how often within that time frame the fluctuations repeat.[73] The emotional response (i.e. pleasure or annoyance) to noise frequency varies among humans and animals, and is unknown for many wildlife

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[69] Id.
[70] Id. at 3.
[71] Id.
[72] Id.
[73] Id.

species.[74] Generally the typical human ear finds high frequency sounds more annoying than other frequencies.[75]

Aircraft noise generates a complex frequency structure, i.e. noise that includes many different frequencies.[76] The human ear's sensitivity to varying frequencies changes with the magnitude of the sound.[77] Scientists have tried to assign methods of "frequency-weighting" to give a standardized measurement on sound-level measures.[78] However, human response to sound, particularly the quantum of sound that is annoying or painful, remains largely subjective.

Different techniques have evolved to try and quantify the noise impact of civilian aircraft upon local populations. The two most commonly used techniques are composite measures typified by the Equivalent Continuous Noise Level (Leq) and the Day-Night Average Sound Level (DNL).[79] In 1974 the Environmental Protection Agency (hereinafter EPA) reported that the Leq and DNL techniques were the best measurements for describing environmental noise in a simple, uniform way.[80]

The DNL technique takes into account the diurnal behavioral patterns of the typical human population by increasing the numerical value for sound disturbances generated at night.[81] Despite this adjustment, the DNL technique has been criticized as inadequate to measure the actual impact of aircraft noise upon local population.[82] One

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[74] Id.
[75] Id.
[76] Id.
[77] Id.
[78] Id.
[79] Kristin L. Falzone, Airport Noise: Is There A Solution In Sight?, 26 B.C. Envtl. Aff. L. Rev. 769, 772 (Summer 1999).
[80] EPA-550/9-47-004, Information on Levels of Environmental Noise Requisite to Protect Public Health.
[81] Id. See also Scott J. Hamilton, Allocation of Airspace as a Scarce National Resource, 22 Transp. L. J. 251, 260 (1994) (nighttime is defined as 10 p.m. to 7 a.m.).
[82] Falzone, supra note 79.

criticism is that because both DNL and Leq average the sound over a set period of time. Hence they fail to describe or accurately quantify the impact of noise disturbances that are occasional, but very loud -- for instance, heavily loaded jet aircraft at take off.[83]

Commentators have suggested that these shortcomings are best addressed by devising a more sophisticated technique for measuring the impact of noise on the local population. For example, Falzone suggests that an alternative measure, the sound exposure level (SEL) is capable of quantifying an event's sound level normalized to one second, and is gaining popularity as a supplemental measure to the Leq and DNL techniques.[84]

Using dual measuring techniques is not an unprecedented idea in U.S. environmental law. Just as air pollution can be measured in terms of both a maximum twenty-four hour concentration and by an annual arithmetic mean,[85] so could noise pollution control benefit from a dual technique approach setting a maximum tolerable noise level and an average tolerable mean noise level.

It is important to understand that the DNL already incorporates the SEL as part of its calculation methodology.[86] The key distinction between DNL and SEL is that SEL is a single-dose metric, not a metric that is quantitatively diluted by averaging noise measurements over time. For that reason, SEL is similar to the Effective Perceived Noise Level (EPNL) which is the standard used by the ICAO and FAA for certification that aircraft engines meet noise standards. EPNL is discussed in greater detail below.

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[83] Id. at footnote 29.

[84] Id. at footnote 28.

[85] See e.g., 40 C.F.R. Part 50 (2001) (setting forth the National Ambient Air Quality Standards for particulate matter and sulfur dioxide).

[86] See Aviation Noise Effects, supra note 65 at 16 (giving the definition of DNL as "[A]n airport cumulative metric derived from SEL with the following applications: Airport Noise Contours, Airport Noise Analysis, FAR 1050.ID Analysis, General Eligibility for Soundproofing, and Noise Monitoring

B. Health and Economic Impacts of Noise

Noise pollution is often overlooked because, unlike contaminated water, smog-filled air or toxic landfills, it is perceived as annoying but not potentially life-threatening. Studies have shown, however, that there are serious health impacts from noise pollution.[87]

Aircraft noise may lead to an increase in chronic fatigue (from lack of sleep) and in neurotic complaints (from mild anxiety to severe inability to function) and is linked to causing learning problems for school children.[88] The economic impacts aircraft noise include diminished real estate value, limitations on land use, and impact on wildlife and farm animals.[89]

III. U.S. CONTROLS ON NOISE POLLUTION

Traditionally, landowners plagued by aircraft noise have sought legal relief in tort for nuisance, or by making a civil property claim of inverse condemnation under the Fifth Amendment of the United States Constitution.[90] Historically, however, courts have often limited relief for landowners pleading nuisance by weighing the social utility of aviation against the overall impact to landowners.[91] Therefore nuisance has not been a suitable

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Systems").

87 See, e.g., Berglund & Lindvall, Community Noise 77–87 (WHO ed. 1995) (discussing generally how various studies have shown that noise affects blood pressure, heart rate and vasoconstriction, as well as having deleterious psychological effects by accelerating and intensifying mental disorders).

88 Benedicte A. Claes, Aircraft Noise Regulation in the European Union: The Hushkit Problem, 65 J. Air L.& Com. 329, 337 (Spring 2000).

89 Aviation Noise Effects, supra note 65 at 63-67, 99-101.

90 Falzone, supra note 79 at 775-779.

91 Id. at 776.

fulcrum for landowners seeking legal redress for damages from aircraft noise. For that reason, most noise cases are grounded in an inverse condemnation (takings) theory.

A. Takings Caselaw

The first significant Supreme Court case addressing the subject of aircraft noise was United States v. Causby.[92] In Causby, the Court granted a plaintiff chicken farmer monetary recovery for inverse condemnation of the farmer's property resulting from the United States causing aircraft noise damages to the plaintiff's property (i.e. the noise disturbed his chickens and they failed to thrive). He suffered harm to his business and to his health when both deteriorated due to the frequent noise and bright lights caused by U.S. military aircraft flying over his land.[93]

The next significant Court case after Causby was Griggs v. Allegheny County.[94] In that case the Court again recognized that local landowners had a right to be compensated when defendant's aircraft noise and vibration unreasonably disturbed the use and enjoyment of their land. One notable distinction between Causby and Griggs, however is that Griggs involved civilian aircraft operating at a civilian airport run by the local municipality.

The Court held that the local municipality was liable for the noise because it decided where the airport and its runways would be placed and what sorts of land and

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[92] John J. Jenkins, Jr., The Airport Noise and Capacity Act: Has Congress Finally Solved the Aircraft Noise Problem?, 59 J. Air L. & Com. 1023, 1024 (May/June 1994), referring to 328 U.S. 256 (1946).
[93] 328 U.S. 256, (1946) (hereinafter Causby).
[94] 369 U.S. 84, reh'g denied, 369 U.S. 857 (1962) (hereinafter Griggs).

navigation easements were required.[95] Notably, the Court specifically rejected the argument that the U.S. federal government should be liable because of its control and regulation of aviation.[96] This important distinction between federal control and local liability is repeated in later Court decisions.[97]

As a general rule, courts have established a presumption that low-altitude aircraft, usually those flying at 500 feet in altitude or less over private land generate sufficient noise to constitute a taking of land under their flight path. In contrast, "flights at higher altitudes [do] not interfere with the landowner's use of the surface."[98] This judicial approach corresponds to the regulatory minimum safe altitude of flight prescribed as navigable airspace over "other than congested" areas.[99]

Despite the general judicial presumption that flights over 500 feet will not create a taking, federal courts have made exceptions based upon the particular facts of the case at hand. For example, in Branning v. United States, the Court of Claims found flights above 500 feet could constitute a taking because of the effects of the aircraft's noise and the proven loss to the landowner's property value.[100]

Similarly, in Argent v. United States, a case wherein the flights were sometimes overhead, but often just at the corners of the plaintiff's property, the Federal Circuit held that the peculiarly burdensome nature of the flights were sufficient to sustain plaintiff's

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[95] Id. at 89-90.
[96] Id. at 89-90.
[97] See City of Burbank v. Lockheed Air Terminal, Inc., 411 U.S. 624 (1973) (discussed infra at Section III).
[98] Argent v. United States, 124 F.3d 1277, 1281 (Fed. Cir. 1997); See also Lacey v. United States, 595 F.2d 614 (Ct. Cl. 1979), Aaron v. United States, 311 F.2d 798, 801 (Ct. Cl 1963).
[99] 14 C.F.R. § 91.119 (in a congested area the prescribed altitude is 1,000 feet above the highest obstacle within a horizontal radius of 2,000 feet of the aircraft).
[100] Branning v. United States, 654 F.2d 88, 101 (Ct. Cl. 1981) (discussing the particularly noisy and intrusive nature of military training flights).

takings cause of action.[101] The takings cases illustrate that federal courts have tried to balance the plaintiff's right to enjoy their environment and have fair use of their land while recognizing the importance of aviation in national trade and commerce.

B. Noise Control Statutes and Regulations

Implemented in recognition that aircraft noise was an increasing societal problem, the 1968 Amendments to the Federal Aviation Act required the FAA to prescribe standards for aircraft noise abatement. Congress mandated that the FAA include noise as an analysis factor when it reviewed commercial aircraft and aircraft engine designs.[102]

Pursuant to the 1968 Amendment's mandate, in 1969 the FAA promulgated regulations that required the phase out of Stage 1 aircraft by 1988.[103] These phase out regulations are commonly referred to as Federal Aviation Rule 36 or FAR 36. The aviation industry resisted the regulations because they imposed a heavy financial burden by requiring airlines to replace phased-out aircraft.

Congress also tasked the EPA to assist tackling the problem of aircraft noise control. For example, the Federal Aviation and Noise Control Act of 1972 directed EPA to study and set noise control standards in many industries, including commercial aviation.[104] The 1972 Act, however, preserved the FAA's right to reject any of the EPA's recommendations, if the FAA found that the proposed noise control measures threatened

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[101] Argent, supra note 97 at 1282.
[102] Id.
[103] 43 Fed. Reg. ¶ 18,355 (1969); codified at 14 C.F.R. Part 36.
[104] 49 U.S.C. 1431.

safety or were technologically or economically unfeasible.[105] Therefore, the FAA's de facto veto power over the EPA considerably weakened the efficacy of the 1972 Act.

Not too surprisingly, many of the EPA recommendations were unheeded, leaving states to use litigation to try to compel the FAA to implement EPA recommendations.[106]

More tension was generated in 1976. At that time the FAA found that airlines were evading FAR 36 requirements for less noisy aircraft designs by continuing to fly older aircraft.[107] In response, the FAA issued new regulations, FAR Part 91. FAR Part 91 applied stricter noise standards retroactively so that existing aircraft were no longer grandfathered from control.[108]

Congress responded to the inter-agency and state tensions generated by the 1968 Amendments and the 1972 Act by passing more legislation. In 1979, Congress passed the Aviation Safety and Noise Abatement Act.[109] This 1979 Act lessened the economic burdens on airlines caused by the FAR 36 regulations by granting them exemptions from the compliance deadlines for aircraft with only two or three engines.[110]

More significantly, the 1979 Act directed the FAA to develop a uniform system for measuring aircraft noise levels and for determining compatible land uses for areas that experienced different levels of noise.[111] Airport proprietors were then able to develop noise exposure maps to target problem noise areas that were filed in local land record

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[105] 49 U.S.C. 1431 § 1(A), (B).
[106] U.S. Studies State Suit Seeking Mandatory Response on Noise, Aviation Wk. & Space Tech., Nov. 1, 1976, at 29.
[107] See Vicky Tsilas, Note, An Analysis of the Phase-Out Provisions of the Airport Noise and Capacity Act of 1990, 4 Fordham Envtl L. J. 83, 86 (1992).
[108] See 14 C.F.R. §§ 91.801-91.877 (1997).
[109] Pub. L. No. 96-193, 94 Stat. 50 (codified at 49 U.S.C. App. §§ 2101-2125).
[110] 49 U.S.C. §§ 2123-2124.
[111] Id. at §§ 2102-2106.

offices. Airport proprietors were also eligible for federal grants to develop noise compatibility programs based upon the maps.[112]

One collateral advantage of the noise exposure map process was that airport operators were able to give notice to local property owners and potential purchasers of the airport noise levels.[113] This, in turn, could serve to limit the airport operator's liability in a noise-related nuisance or takings lawsuit brought by the landowner or purchasers. If an airport operator could show that the plaintiff property owner or purchaser had actual or constructive knowledge of the noise exposure map, then the plaintiff had greater difficulty proving his case.

For instance, if the plaintiff had actual or constructive notice of the map, he would then have to prove there had been a significant change to the noise levels described in the noise exposure map. The plaintiff would need to demonstrate change in the type or frequency of the aircraft operation, or that the airport layout changed, or that the flight patterns changed or night operations increased.[114]

Congress continued to adjust the balance of noise control and commerce by enacting noise control statues. In 1990, Congress passed the Airport Noise and Capacity Act.[115] The 1990 Act was intended to integrate noise restrictions into a coherent national policy. Opponents argued that it gave the FAA too much control over what was better left as local land use issues.[116]

The 1990 Act included two separate programs. First, the national aviation noise policy completely barred state and local authorities from restricting the operation of Stage

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[112] Id. at §§ 2103-2104.
[113] 49 U.S.C. § 2107(b).
[114] Id. at § 2107(a).
[115] Pub. L. No. 102-558, 106 Stat. 4217 (codified at 49 U.S.C. §§ 2151-2158).

2 aircraft at all or from restricting the operation of Stage 3 aircraft without prior FAA approval or the airlines' consent.[117] Second, to balance that local loss of power to control aircraft noise, the 1990 Act also provided however for nationwide phase-out of the noisier Stage 2 aircraft by 31 December 1999.[118] In such manner the 1990 Act set the stage for even greater federal control of aircraft noise.

C. Federal Preemption Versus State/Local Control

As can be inferred from the discussion above, noise pollution control, like many environmental regimes, exemplifies the classic tension between competing federal and state/local interests. This tension is manifested in the somewhat differing policy goals of federal and state governments.

From a federal policy perspective, airports must be consistently available nationwide at regular hours to allow the free flow of goods and passengers in interstate commerce.[119] Federal policy is also reflected in regulations that are designed to assist the airplane manufacturing industry by setting a consistent rules for building their aircraft.[120] Hence federal policy is manifested in both control of making and operating commercial aircraft.[121] From a local perspective, control of aircraft noise is desirable in order to

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[116] See generally Falzone, supra note 79 at 788; Jenkins, supra note 92 at 1037.
[117] See 49 U.S.C. § 47528; See also Jenkins, supra note 92 at 1037; Falzone, supra note 79 at 788-789.
[118] Id.
[119] See generally Jenkins, supra note 92, Falzone, supra note 79.
[120] Jenkins, supra note 92 at 1043.
[121] Ann Thornton Field & Frances K. Davis, Can the Legal Eagles Use the Ageless Preemption Doctrine to Keep American Aviators Soaring Above the Clouds and Into the Twenty-First Century?, 62 J. Air L. & Com. 315, 336 (Nov./Dec. 1996).

protect local property values, and ensure that aircraft noise does not disturb school, workplace or home environments.[122]

From a practical perspective, it is evident that the federal and state policy approaches discussed above may conflict. For example, the federal policy interest in unimpeded interstate commerce may result in federal regulations that cause more aircraft noise in local state areas than the states would otherwise be willing to legally condone. In such cases, however, the federal policy often preempts the state interest, spurring lawsuits by state actors and providing the historical genesis of preemption caselaw, which is an important element of the noise pollution legal landscape.

1. Preemption Caselaw

The leading federal case on preemption is City of Burbank v. Lockheed Air Terminal, Inc.[123] In Burbank, the Court held that the 1972 Noise Control Act preempted state and local control of curfew ordinances. Some commentators have argued that Burbank was not as strongly in favor of federal preemption of airport noise control as it might have been. [124] They note the Court's majority opinion included *dicta* distinguishing between municipalities as regulators exercising police powers and municipalities as owners of airports.[125] Thus the intent of the Court, interpreted in the

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[122] See, e.g., David Holzman, Plane Pollution, Environmental Health Perspectives, Vol. 105, Number 12 (available at <http://ephnet1.niehs.nih.gov/qa/105-12focus/focus.html>, visited Jan. 2, 2001).

[123] 411 U.S. 624, 638 (1973).

[124] Steven H. Magee, Protecting Land Around Airports: Avoiding Regulatory Taking Claims by Comprehensive Planning and Zoning, 62 J. Air L. & Com. 243, Aug./Sept. 1996, at 249 (citing and concurring with Linda A. Malone, Environmental Regulation of Land Use, 11-24 (1991)

[125] Id.

light of *dicta*, may have been to limit federal preemption to municipalities acting as regulators.

The *dicta* of Burbank highlights issues first raised by the Court in Griggs, eleven years before. However this is a necessary distinction in light of the legal grounds rules first set forth in the Griggs[126] case. The legal and policy implications of a municipality that governs a local privately owned airport are often different than when the same municipality both owns and governs the airport. A local municipality that owns an airport must make reasonable rules about local land use and zoning to reduce the impact of aircraft noise on local landowners because that municipality will be financially liable if those landowners bring a takings claim against the airport.

In contrast, a municipality that does not own the airport but instead merely attempts to govern the airport's operations by imposing curfews or similar limits may be exercising its police powers in a way that infringes on a federally regulated industry, i.e. commercial aviation. Thus, a municipality that does not own the local airport is not exposed to takings suit by local landowners, but is subject to preemption of its rules and regulations by federal actors such as FAA implementing federal regulations.

Exacerbating the tension between federal and local control of aircraft noise, is the fact that airports, which have historically been built in rural areas, have become both encroached upon by urban growth, and the victims of their own success as 'magnets' for development.[127] Airport noise has become more of a legal and political issue in recent years because landowners and the voting public are living and working near airports that

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[126] Griggs, supra note 94.

[127] Magee, supra note 124 at 244-245; Donald W. Tuegel, Airport Expansions: the Need for Greater Federal Role, 54 Wash. U. J. Urb. & Contemp. L. 291 at 291-293 (Summer 1998).

were formerly isolated in rural areas. This, in turn, has sharpened the edge of the legal debate over whether federal or local law should govern in controlling aircraft noise.

The line between federal and state control of aircraft noise has been defined in case law. A series of federal cases after Burbank have continued to illuminate where federal control ends and state or local control begins. For example, in Gustafson v. City of Lake Angelus,[128] the Sixth Circuit reversed a district court's finding that federal law so preempted the field of aircraft noise control to the extent that a town could not prevent seaplanes from landing on a local lake.[129] Instead the court found that the town had clear interest in regulating aircraft landing areas, whether they land on land or on water.[130] Therefore, cases such as Gustafson illustrate that local regulatory interests may sometimes sufficiently outweigh federal interests to prevent federal preemption from totally occupying the field of aircraft noise control law.

2. The Limitations on Current Remedies to Address Airport Noise

Many scholars argue that airport noise is a growing problem. According to Creswell, one of the failures of current noise control laws is that the laws give neither air carriers nor the federal government any incentive to proactively improve noise control compliance.[131] Creswell postulates that new legislation with attendant new causes of

[128] 76 F.3d 778 (6th Cir. 1996).
[129] Id. at 783-785.
[130] Id. at 789.
[131] Creswell, supra note 9 at 28.

actions and remedies has not been forthcoming because of the parties with vested interest in the status quo wield great political power.[132]

He also attributes part of the problem to the fact that those who are responsible for aviation noise control have no concomitant financially responsibility if noise control fails.[133] Creswell believes a proactive federal policy would cure stagnation in the development of airport noise control law.

Tuegel also argues that greater federal control of airports would allow for much needed infrastructure expansions, enhancing the flow of air traffic at currently overbooked airports.[134] Under existing law, modifications to runways, taxiways and air traffic control facilities on existing airport grounds fall under the category of "aircraft operations" and are generally under the control of the federal government, unless such modification requires the use of additional land.[135]

In that instance, use of additional land is deemed local land use, and therefore the modifications can be mired in the litigation that often surrounds land use issues.[136]. Tuegel points out that federal control over all most airport infrastructure modifications, notably those involving the use of additional land, would effectively eliminate the modifications being thwarted or stalled by lawsuits of irate local property owners.

Accordingly, Tuegel proposes that local zoning regulations preventing further airport growth should be barred under the preemption doctrine when:

> (1) There is a demonstrated need to expand for either safety or capacity reasons;

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[132] Id.
[133] Id. at 30.
[134] Tuegel, supra note 127 at 291-293.
[135] Id. at 294.
[136] Id.

(2) The local regulation will halt or delay an expansion that has received approval of the FAA;

(3) The airport at issue has a substantial effect on national air traffic (i.e. it has many scheduled commercial flights); and

(4) The region has, through its local political process, either: (a) rendered a public decision that the airport will be its facility for the future with no express limitations on capacity or (b) debated potential alternatives for a reasonable period of time (perhaps one or two years), but has not rendered a decision.[137]

Therefore, Tuegel's four prong approach to barring local zoning gives greater power to the FAA to accomplish airport infrastructure modifications that benefit the nationwide public as a whole at the detriment to the interests of local interests, particularly the interests of local property owners.

Other legal scholars question whether federal control of civilian aircraft noise and airport operations has gone too far, such as Morrison, Winston and Watson.[138] Using a cost-benefit analysis, they posit that the 1990 Airport Noise and Capacity Act mandate to eliminate all Stage 2 aircraft from U.S. airports by 31 December 1999, was not economically beneficial to society as a whole.[139] They reach this conclusion by assessing the airline's capital cost of retrofitting old aircraft or purchasing new ones as compared to the value of resultant noise reduction to the property owners near the airport.[140]

This study however, assumes that all costs and benefits of noise reduction can be quantified economically in dollar terms. One of the great dichotomies in perspectives between environmentalists and economists is that they differ on how to accurately

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[137] Id. at 318.

[138] Steven A. Morrison, Clifford Winston & Tara Watson, Fundamental Flaws of Social Regulation: The Case of Airport Noise, 42 J. Law & Econ. 723 (October 1999).

[139] Id.

[140] Id. at 724-734.

quantify the benefits or detriments to the environment.[141] For instance, a typical environmentalist would probably argue, with some merit, that the Morrison Winston and Watson study understated the benefits to local property owners in reducing airport noise.

Therefore the study presented a skewed result because a significant element of that benefit derives from hedonic, versus financial, sources. Nonetheless there is merit in their approach. Because local government is probably in a better position to evaluate such non-monetary benefits, local control of airport operations may be favorable over increased federal control. However a shift in the balance towards local control would ultimately cause the airlines economic harm because inconsistent regulation makes inefficient business. Hence Morrison, Winston and Watson's proposal is not viable.

Other commentators theorize that greater local power in zoning laws can make for a peaceful coexistence with federal interests. Magee, for instance, suggests that the problem of airport congestion and local airport noise concerns can best be addressed through improved, rather than reduced, local zoning law.[142] Magee suggests that "overlay" zoning may be the optimal method of land use control near local airports. Local governments implement overlay zoning through enacting new zoning regulations that are added to existing zones in a separate provision.

Overlay zoning is analogous to the clear picture overlays that are superimposed on a map to add more features to the existing topography. Similarly, overlay zoning would be enacted to add zoning features and rules to previously existing zoning. Therefore local, not the federal, government is best suited to tailor such a zoning overlay to optimally reduce airport noise pollution and satisfy local pollution concerns.

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[141] See, e.g., Steve Charnovitz, Trade and the Environment: Four Schools of Thought, Ecodecision, Jan. 1994, at 23.

Magee notes that the benefits of overlay zoning are:

> (1) Boundaries of overlay zones fit into the affected area without having to consider the boundaries of existing or proposed land uses or property lines.
> (2) Overlay zones are a simple, but effective, way to permit different uses and regulation of development within the confines of conventional zoning.
> (3) Overlay zones are easier politically and administratively to adopt than re-zonings or overall amendments of development regulations by the supervising government.[143]

Conversely, Magee recognizes some shortcomings of overlay zoning, including these problems:

> (1) Overlay technique adds another layer of regulation and review to the property.
> (2) Unless carefully conceived, overlay zoning can significantly curtail the reasonable use of property creating over-regulation that could lead to a regulatory takings claim.[144]

Zambrano concurs with Creswell by asserting that the current legal framework does not properly balance the interests of airport development with those of the neighboring property owners.[145] He attributes this imbalance to the variations in local zoning laws that serves to create nationwide inconsistencies in airport development.[146] He also argues that the judicial deference frequently given to court review of airport developers' environmental impact studies do not provide incentive for developers to find alternatives to lessen the impact of aircraft noise.

Similarly, Zambrano notes the variations in court's willingness to grant legal relief to private plaintiffs alleging tortious airport noise is constrained by the high burden

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[142] Magee, supra note 124 at 246-247, 269- 278.
[143] Id. at 270.
[144] Id.
[145] Luis G. Zambrano, Balancing the Rights of Landowners With the Needs of Airports: The Continuing Battle Over Noise, 66 Air L. & Com. 445, 490-497 (Winter 2000).
[146] Id.

of proof that such plaintiffs must prove, namely that the airport noise exceeded what is reasonable and foreseeable.[147]

Zambrano offers a novel approach to solving these problems, one that focuses on the basic operational precept of the present national air travel system. He proposes that the national air system should move away from the modern "hub and spoke" organization of airports because it is outdated and no longer efficient.[148] He makes three suggestions to mitigate airport congestion problems allegedly caused by the hub-and-spoke system while still protecting the local landowner's rights:

> First, the government should provide incentives for the developments of "wayports" located in relatively less populated areas for the purpose of hubbing connecting passengers. Second, the government should provide incentives to state and local governments to convert former military bases for civilian use. Finally, the government should route all "pure" cargo traffic through smaller regional hubs rather than through passenger airports.[149]

Under Zambrano's proposal, wayports could help to solve the current congestion problem. Paradoxically, they could also actually intensify the congestion by encouraging greater air traffic by making access easier and enabling more people to fly. There are real world illustrations of this phenomenon. For instance, as mentioned in footnote 23, supra, the 1990's heralded an influx of technology-intensive business into the Northern Virginia area surrounding Dulles airport. To a significant degree, the business, and their attendant populations, have located near Dulles airport to facilitate access to its interstate travel opportunities.

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[147] Id.
[148] Zambrano, supra note 145 at 490-497.
[149] Id. at 491.

The previously bucolic area around Dulles airport has grown increasingly congested and noisy as businesses have moved near the airport and as the airport has increased operations to meet the air travel demands associated with the business. Thus, the Dulles airport story demonstrates that moving an airport to a relatively rural area tends to prevent the area from staying rural and that Zambrano's vision of wayports may spur more of such congestion at other places in the nation.

A second hazard of Zambrano's approach is that people may opt to start their journey at the more distant airport, increasing both air and vehicular traffic. Similarly, Zambrano's proposal to convert military bases for civilian airline use poses its own inherent problems. Many closed bases are still in the process of cleaning up hazardous wastes.[150] The fact that bases tend to be located in traditionally less expensive real estate areas means that any federal proposal for conversion could raise environmental justice concerns.[151] Therefore Zambrano's proposal to convert military bases into civilian airports, while seemingly a simple solution to airport congestion, may create other costly problems without solving the initial concern.

3. Preemption's Effect on Federal Decision-Making

Federal preemption of local aviation regulations tends to create a bureaucracy that may upset the balance Congress created between environmental interests and aviation

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[150] See e.g., EPA, On-Line Description of Castle Air Force Base, California, available at <http://yosemite.epa.gov/r9/sfund/overview.nsf/d5fcbad2b91c086688256958005cda60/661f80d3c96209408825660b007ee641/OpenDocument>; visited May 5. 2001 01; EPA, On-Line Description of March Air Force Base, available at <http://yosemite.epa.gov/r9/sfund/overview.nsf/ef81e03b0f6bcdb28825650f005dc4c1/10ae8e28eca0aafc8825660b007ee663?OpenDocument>, visited May 5, 2001.

commerce. Mere compliance with federal environmental statutes does not necessarily result in priority being given to protect the environment.

For instance, the requirements of the National Environmental Policy Act of 1969 (hereinafter NEPA) are triggered whenever any action at a civilian airport is considered a federal action.[152] NEPA guarantees that a federal entity will, at a minimum, review a proposed action to determine whether it causes a significant impact.[153] However NEPA only provides that federal agencies must follow the procedural steps of making the appropriate environmental impact statement (EIS) if required (or environmental analysis or finding of no significant impact if an EIS is not required). It does not mandate that the federal agency selects the best choice for the environment.[154] Therefore NEPA is more of a procedural than substantive statute to protect the environment from the untoward effects of unplanned federal development.

Likewise, relying solely on state and local environmental ordinances does not necessarily guarantee that the best choice for the environment will result. Because of federal preemption local municipalities have limited choices to respond to aircraft noise. Normally they may only restricting land use.[155] This rather one-dimensional approach to the problem makes sense considering the limited power a municipality has to regulate aircraft design or operation. Congress opted for uniform federal preemption to avoid the problem of limited effectiveness of local laws and regulations. Yet this loss of local power may leave local communities without bargaining strength in negotiating

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[151] See e.g., <http://es.epa.gov/oeca/oej/nejac/pdf/1096.pdf>, visited May 5, 2001 (discussing environmental justice claims during the closure of Kelly Air Force Base, Texas).
[152] 42 U.S.C. §§ 4321, 4332(C).
[153] Id.
[154] See Stryckers Bay Neighborhood Council v. Karlen, 444 U.S. 223 (1980).
[155] See Falzone, supra note 79 at 780.

commercial aviation service routes. Deregulation has given the airlines more freedom in selecting which communities to serve, and communities may depend on the jobs and benefits.[156] Therefore preemption may force local communities to accept disturbing noise levels or forfeit air service entirely.

4. Summary of U.S. Limits on Civilian Aircraft Noise

For civilian aircraft, there is a web of interrelated noise control provisions. Airports and airlines are motivated financially to by a desire to avoid paying neighboring property owners for unconstitutional takings. There are federal controls on aircraft design and engines. There is some potential mitigation effects through NEPA, even if those effects are weak. And finally, there is the limited power of the local municipality to control ground operations and what land may be designated for further airport growth. Congress tries to keep these factors in balance, but the power of the aviation industry may outweigh local municipalities.

D. Control of Noise from Military Aircraft

1. What Kind of Noise Do Military Aircraft Generate?

U.S. military fixed-wing aircraft cause two types of noise: (1) subsonic noise generated by turbofan and turbojet engines; and (2) sonic booms caused by shock waves

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[156] Id. at 781.

by differences in pressure along the front and rear portions of an aircraft traveling at or above the speed of sound.[157] Subsonic noise is usually loudest at take-off.[158]

Subjective perception of noise depends upon the terrain. Hills and trees can absorb sound, especially if they are dense and located close to the source of the noise.[159] Sound travels more efficiently over water than land.[160]

One logical solution to military aircraft noise is to try and reduce noise at the source, that is the aircraft engine, but this has been difficult to do, especially with combat jets because of the performance parameters required.[161] The Department of Defense (hereinafter DoD) has been working on new technologies but they are more suited to other, non-combat, DoD missions such as long term intelligence gathering.

At an industry day last year in Alexandria Virginia, DoD announced a new low-noise supersonic aircraft that could conduct long-range reconnaissance missions without being detected.[162] NASA engineers are also studying loud and preventable aircraft flight sounds by analyzing computer images of landing gear wind noise.[163] Therefore military

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[157] Manci, supra note 65 at 7 (this discussion is limited to fixed-wing aircraft because rotary-wing aircraft, namely helicopters, present many more complicated noise-control issues. Current recommendations add +7dB to computing helicopter noise to account for the blade-slap level. See, e.g., Environmental Compliance and Protection Manual Appendices J, K, Note 6, available at <http://www.denix.osd.mil/denix/Public/Policy/Marine/5090.2A/appenj-k.html>, visited May 2, 2001. Helicopters tend to fly at even lower altitudes than fixed-wing aircraft, and are thus more likely to land in densely populated areas simply due to the relatively small space required for their landing. They are ubiquitous to urban landscapes, since they are used for by local police forces and news reporters. According to U.S. Army studies, however, the blade-slap sound of rotary-wing aircraft is even more annoying to the human ear than the noise from fixed-wing aircraft. See e.g., News and Progress Report, available at <http://chppm-www.apgea.army.mil/enp/Update.htm>, visited March 2, 2001.

[158] Id. at 6.

[159] Id. at 12.

[160] Catherine M. Stewart & George A. Luz, Environmental Noise Contouring in the 21st Century, Federal Facilities Environmental Journal 77, Spring 1998, at 82.

[161] Id.

[162] Bryan Bender, U.S. Department of Defense Launches Program to Develop Low-Noise, Supersonic Aircraft, Jane's Defense Weekly, Mar. 29, 2000; reprinted in Noise News for the Week of 26 March 2000; available at <http://www.nonoise.org/news/200/mar.26.html>, visited Mar. 6, 2001.

[163] FLUG REVUE Update for Week ending 3 December 2000, available at <http://www.flug-revue.rotor.com/FRNews00/FR1203.htm>, visited Mar. 8, 2001.

aircraft generate significant subsonic and sonic noise. Technological barriers and performance requirements have prevented the military from achieving satisfactory control of the noise at the engine source.

2. Stateside Control of Military Aircraft Noise

As a proprietor, military bases, like civilian airports have an interest in ensuring that military aircraft noise does not create so much interference with adjoining land that the landowners can successfully assert inverse condemnation claims against the military base. To combat this potential legal problem, the DoD has developed the AICUZ (Air Installation Compatible Use Zone) program. The AICUZ program is set forth in DoD regulations and thus applies to all branches of the military.[164] AICUZ is implemented by regulations within each of the service branches.[165]

According to the Air Force's Air Installation and Compatible Use Zone Environmental Law Primer,[166] "[t]he precise statutory authority underpinning the DOD AICUZ program is uncertain."[167] As early as 1957, the Air Force began establishing a basic procedure that was precursor to AICUZ; the program estimated noise and assessed its impact on the local community.[168] In 1973 the Air Force began using the NOISEMAP

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[164] 32 C.F.R. Part 256.

[165] See, e.g., Air Force Instruction (AFI) 32-7063, Air Installation Compatible Use Zone Program.

[166] Major Ann Mittermeyer USAFR & Ronald Forcier, Environmental Law Primer, Air Installation Compatible Use Zoning Program and Noise (last revised by JACE staff Nov. 21, 2000) (hereinafter AICUZ Primer), available at <https://aflasa.jag.af.mil/GROUPS/AIRFORCE/ENVLAW/MISC/aicprim.htm>, visited Apr. 29, 2001.

[167] Id. at 2 (noting that although Executive Order 12088 para. 1-1 directs federal agencies to comply with, *inter alia*, The Noise Control Act of 1972, 42 U.S.C. 4901 et seq., that Act specifically excludes aircraft engine and design from its definition of product and delegates all control of operational aircraft to the FAA).

[168] Id.

computer program[169] and this formally became the beginning of the AICUZ program in 1974.[170] The Air Force constantly revises the NOISEMAP program. While the current version of NOISEMAP treats all aircraft noise as if it were spreading across a flat terrain, a new version is being developed to model changes in local topography due to water and hills.[171]

Like civilian airports, the military uses the DNL noise descriptor.[172] DoD regulations do allow alternative approaches if authorized by state or local law.[173] Under current guidelines published by the Federal Interagency Committee on Urban Noise, most development is compatible with noise levels of 65 DNL.[174] In a process similar to the noise contour maps prepared by civilian airports, DoD facilities plot out noise contours for DNL 65, 70, 75 and 80 as part of the AICUZ study.[175] Areas where the levels exceed 75 DNL are not compatible with most residential or general public access uses.[176]

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[169] NOISEMAP is a computer program that is essentially the military equivalent of the civilian noise contour maps described supra in section IIIB.

[170] AICUZ Primer, supra note 165 at 3.

[171] News and Progress Report, at 1, para. 2, available at <http://chppm-www.apgea.army.mil/enp/Update.htm> visited Mar. 2, 2001; See also Stewart, supra note 160.

[172] 32 C.F.R. §§ 256.3 (d)(1), 256.10; AFI, supra note 165 at § 1.3.5.1.

[173] 32 C.F.R. 256.3 (d)(1).

[174] Federal Interagency Committee on Urban Noise (FICUN), Guidelines for Considering Noise in Land Use Planning and Control (1980), available at <http://www.cfaspp.com/AvNoiseBack.htm>, last visited May 8, 2001 (according to Larry W. McGlothlin, Executive Secretary to the FICON, 1990-1992, FICUN was developed in 1979 to put the various federal agencies' policy and guidance packages on environmental noise in perspective, and hence the guidelines were developed. FICUN identified 65 dB as the criteria for further governmental action due to "significant" average community reaction. A new group, the Federal Interagency Committee on Noise (FICON) succeeded FICUN in 1990. FICON studied the technical, legal and policy impacts of airport noise, and whether science had evolved to provide better metrics. A third study team, the Federal Interagency Committee on Aviation Noise (FICAN) sprang to life in 1993 to provide a debate forum for the future of aviation noise research. To date, this group has not yet proposed any significant changes to the DNL standard. See McGlothlin Associates, Inc., Background on the Development of Current Federal Aviation/Airport Noise Impact Assessment Guidelines, available at <http://www.cfaspp.com/AvNoiseBack.htm>, visited May 8, 2001.

[175] 32 C.F.R. § 256.3(d)(2)(I); AICUZ Primer, supra note 165 at § 2.4.

[176] See FICUN, supra note 174.

Unlike municipalities, military bases have no control over what zoning rules are made.[177] Even though landowners have sometimes filed lawsuits alleging that the AICUZ study has diminished their property value, federal courts have typically found that the federal government is not liable for local government action. Therefore the AICUZ does not constitute a Fifth Amendment taking or inverse condemnation of the property.[178] The military is cautioned however, that,

> Participation in the zoning process, although it can be extensive, should remain as neutral as possible with its principle focus on sharing information and advising local land use planners regarding the requirements of our military operations and its external consequences for the purposes of enhancing their understanding and appreciation of the nature of the military mission at the installation. Any attempts to coerce, intimidate, or Lord forbid, threaten local zoning officials to accept ALL of the Air Force land use compatibility suggestions or otherwise expect dire consequences (i.e. Base Closure) may amount to conduct which is not legally sanctioned participation and influence on the local zoning process by affected land owners.[179]

Ironically, the military is in a position somewhat analogous to the non-municipal airport proprietor. Like that non-municipal proprietor, the military is physically located in a political municipality where the local zoning ordinances and police powers are beyond their control or influence. Despite this lack of control over local zoning rules both non-municipal proprietors and the military face potential financial liability if the aircraft noise exceeds the threshold of acceptable use and therefore constitutes a taking of the neighbor's property.

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[177] 32 C.F.R. § 256.4.

[178] See, e.g., Blue v. United States, 21 Cl. Ct. 359, 362 (1990) (citing cases); Stephens v. United States, 11 Cl. Ct. 352, 363 (1986); But see F.E. Trotter, Inc. v. Watkins, 869 F.2d 1312, 1316 (9th Cir.1989) (where the court, in dicta, allowed that an AICUZ could theoretically be the basis of a Fifth Amendment takings claim stating, "For the purposes of this appeal we assume that the preparation of an AICUZ constituted a taking").

[179] AICUZ Primer, supra note 165 at 15.

From the municipality's perspective a military base is parallel to a non-municipal civilian airport because the municipality must tolerate the noise of aircraft in its midst with no ability to control the source of the noise. Instead the municipality may only control local zoning to mitigate the aircraft noise's intrusive effect.[180]

Military aircraft noise may cause great ambivalence or divisiveness within the community. On one hand, the community may like the economic opportunities that are associated with the military facility, but on the other hand, they may wish the noise did not accompany it.[181] Local politicians and landowners may feel powerless to affect the federal NEPA decision making process because a Final Environmental Impact Statement need only be "adequate" to serve as a basis for a court to dismiss their claims on summary judgment.[182] In this respect military bases are also like nonmunicipal civilian airports.

3. Noise from Military Aircraft Operating Overseas

Military aircraft in overseas environments are also thrust into a complex legal position. Complaints are common in densely populated areas and can cause more friction

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[180] See, e.g., Cox v. City of Witchita Falls (slip op.)(U.S.D.Ct., N.D. Tx, Sept. 1, 1999). This case was affirmed without opinion by the 5h Cir., April 9, 2001. The District Court granted summary judgment to the Air Force after the plaintiff claimed the AICUZ plan was an unconstitutional taking of his property. Concerning the merits of plaintiff's takings claim, the court noted, "[E]nactment of the Ordinance was a proper exercise of the police power and was rationally related to a legitimate government objective -- to protect the lives and property of the users of the airport at Sheppard, to protect the lives and property of the occupants of land in the vicinity of Sheppard, and to preserve Sheppard as a viable social and economic resource for the City." (Slip opinion at 11).

[181] See e.g., Carl B. Anderson, Letter to the Editor, Virginian-Pilot, April 14, 2000, at B-10 (reprinted in Noise News for the Week of April 9, 2000) (complaining that the increased number of Navy jets is no longer the "sound of freedom," but instead the cause of loss of quality of life).

[182] See e.g., Citizens Concerned About Jet Noise, Inc. v. Dalton, No. 99-1887 (unpublished opinion, July 19, 2000) reported at 2000 U.S. App. LEXIS 17422.

when the local populace is displeased with the U.S. military presence for other reasons.[183] Although the local population may not have much legal control over U.S. military aircraft noise, they may demonstrate their displeasure by other means. For instance, at Atsugi Naval Air Station in Japan, local residents petitioned the government to refrain from cleaning up dioxin waste from an industry next to the air station until the United States commander satisfactorily addressed the local residents' noise concerns.[184]

U.S. overseas bases, however, are not immune from complying with environmental laws. Indeed, DoD has promulgated an Overseas Environmental Base Guidance Document (OEBGD) that sets out objective criteria for overseas installations to follow in managing pollution control.[185] The OEBGD was recently revised (March 2000), but Chapter 10, addressing Noise, remains "reserved", in other words, unwritten.[186]

In addition to the OEBGD, DoD has also drafted Final Governing Standards (FGS), for the various foreign countries in which military bases are located. In contrast to the OEBGD, there are FGS provisions that govern noise. However, the provisions

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[183] See e.g., Japanese civil lawsuit filed in 1998 against Kadena Air Base in Fukuoka suing the Japanese government for 6.2 billion yen and requesting a ban on flights after 7 p.m. (Reported in the Mainichi Daily News, March 28, 2000, at 1 and in The Daily Yomiuri, March 28, 2000, at 2; reprinted in the Noise News Week for 26 March 2000, available at <http://www.nonoise.org/news/2000/mar26.htm>, visited March 6, 2001. The Kadena lawsuit came a few years after the infamous rape of a young Okinawan schoolgirl by three Marines. The rape triggered significant protests against the U.S. military presence in Okinawa and triggered a renegotiation of the Status of Forces Agreement. See <http://library.thinkquest.org/19981/data/text/koukoku-light-e.htm>, visited May 8, 2001; See also Okinawa Governor Seeks U.S. Troop Reduction, May 9, 2001, available at <http://www.cnn.com/2001/WORLD/asiapcf/east/05/09/japan.okinawa.reut/index.html>, visited May 10, 2001.

[184] See Koichi Iitake, Residents Near U.S. Naval Air Facility in Atsugi, Japan Complain About Military Jet Noise, Asahi News Service, April 13, 2001 (reprinted in Noise News Week for 9 April 2000, available at <http://www.nonoise.org/news/2000/apr9.htm>, visited May 7, 2001.

[185] See <http//www.denix.osd.mil/denix/Public/Library/Intl/OEBGD.html>, visited March 11, 2001.

[186] Id.

specifically exclude noise from operational aircraft.[187] Therefore neither OEBGD nor FGS provide U.S. base commanders with effective noise control rules for overseas operations.

Some commentators have pointed the international treaties addressing the respective duties of nations which send military forces abroad and the nations which receive those forces may provide the necessary noise control guidance to U.S. field commanders. Lt. Col. Richard A. Phelps notes that there is a possible argument (although not heretofore used by receiving States) that paragraph 3 of Article IX of the NATO Status of Forces Agreement (hereinafter SOFA) could be read to require that sending States comply with the higher requirements of the receiving States concerning their use of buildings, grounds and services.[188]

Even so, this reading does not appear to address operational aircraft. Moreover, Lt. Col. Phelps' argument still seems to parallel the division between operational aircraft versus those on the ground expressed in the FGSs, and in the division between federal and local control of civilian aircraft in the United States. Perhaps that concern partly prompted the United States to sign a 1993 Supplementary Agreement with Germany to the SOFA, which requires the application of German law to the use of an accommodation.[189]

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[187] See materials discussing the FGS for Germany and FGS's for Italy and United Kingdom, available at <https://www.denix.osd.mil/denix/Public/Library/Intl/FGS/Italy/note11.html> and <https://www.denix.osd.mil/denix/Public/Library/Intl/FGS/UK/note11.html>, respectively, both sites visited March 28, 2001.

[188] See Lt. Colonel Richard A. Phelps, Environmental Law for Department of Defense Installations Overseas 8 (4th Ed. 1998).

[189] Id. at 16-17, citing at note 91, The Agreement to Amend the Agreement of 3 August 1959, as amended by the Agreements of 21 October 1971 and 18 May 1981, to Supplement the Agreement Between the Parties to the North Atlantic Treaty Regarding the Status of Forces With Respect to Foreign Forces Stationed in the Federal Republic of Germany, signed March 18, 1993 (1993 German Supplementary Agreement). The Agreement came in to force and effect on March 29, 1998, thirty days after deposit

But the 1993 agreement also does not change the noise emissions of aircraft in operation, only ground-based vehicles.[190] Therefore even extending the SOFA to its furthest logical limit does not appear to make it a suitable means for regulating military aircraft noise at overseas bases.

As discussed previously, FAA must first follow NEPA procedures before creating new airports or making major changes to existing airport operations.[191] Where there is a change to military flight procedures that overlaps both military and FAA action within the United States, each involved federal agency is responsible for conducting its own independent NEPA review.[192]

In contrast, there is no statutory requirement for U.S. military commanders to conduct a NEPA analysis overseas prior to making similar changes to airport operations or infrastructure.[193] A federal court has given a limited extraterritorial reach to NEPA in the special circumstance of sovereign-less Antarctica.[194] But for practical legal purposes, NEPA is not a factor in the military's overseas environmental decision-making process.

Despite NEPA's lack of power, other federal law does require some environmental analysis. For example, Executive Order 12114 requires a NEPA-like environmental impact analysis for major federal actions "having significant effects on the environment outside the geographic borders outside of the United States, its territories and possessions."[195]

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of the last sending-State's instrument of ratification or approval.

190 Id. at note 94.

191 See e.g., Dempsey, supra note 58 at 675-676.

192 See North Carolina v. FAA, 957 F.2d 1125 at 1130 (4th Cir. 1992).

193 See e.g., NEPA Coalition of Japan v. Aspin, 837 F. Supp. 466 (U.S.D.C., D.C. 1993).

194 Environmental Defense Fund v. Massey, 986 F. 2d. 528 (U.S. App. D.C. 1993).

195 Exec. Order 12114, Environmental Effects Abroad of Major Federal Actions §. 2-1 (Jan. 4, 1979).

The Executive Order includes actions that would significantly affect: (1) the global commons; (2) the environment of a foreign nation which is not participating or involved in the action; (3) the environment of a foreign nation by generating a U.S.-regulated toxic or radioactive product; or (4) ecological resources of global importance designated for protection by the President or international agreement.[196]

To the extent that the action involves a foreign nation, the responsible federal agency should attempt to find a counterpart in the foreign nation's government to participate in a bilateral study.[197] This conceivably could give a host nation a legal foothold in the decision-making process. The common sense definitions of "participating" and "involved" would suggest it would exclude those nations where the United States is based pursuant to a Status of Forces Agreement.

There is no right for private citizens to sue for failure to comply with the Executive Order.[198] The Executive Order is implemented by DoD Directive 6050.7, but the DoD Directive offers no further clarification.[199] In the final analysis, the Executive Order adds little to enforcing noise control policy at overseas military facilities. For this reason, Congress' careful balance of federal interest versus local control tilts almost entirely towards federal interest when the subject is military aircraft.

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[196] Id. at § 2-3(a)-(d).
[197] Id. at § 2-4(a)(ii).
[198] Id. at § 3-1.
[199] See generally Phelps, supra note 188 at 20-26.

4. Comparison of Civilian Versus Military Controls

While there is a network of federal and local laws and regulations "keeping their difficult balance"[200] to address the needs of local communities and interstate commerce for civilian aircraft, such a balance is not present or is severely constrained where military aircraft are concerned. Like for civilian enterprises, the prospect of a Fifth Amendment takings claim does serve to influence the military's operation of aircraft in populated areas.

But noise control on military aircraft design must always be secondary to performance needs. Local communities' ability to control military aircraft noise is probably even less than their power over civilian aircraft. Finally, within the United States at least, NEPA ensures that the federal government will scrutinize major changes for their potential impact and that the public has the right to provide input. But there is no analogous check or balance for overseas locations. Some nationalistic Americans may think this is appropriate, given the importance of national defense and the administrative burdens NEPA can impose.

However, such nationalists cannot assume that other nations will concur that concessions to aircraft noise in the name of U.S. national defense and "the sounds of freedom" should be made at their expense. Hence there are no federal or local rules to impose a balance upon military aircraft noise.

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[200] Richard Wilbur, from the poem, Love Calls Us to the Things of This World, in The Voice is Great Within Us; American Poetry of the Twentieth Century (Hayden Carruth ed., 1970).

IV. ICAO HISTORY AND STRUCTURE

A. Early Aviation Agreements

Aviation technology developed largely during the two world wars, and in peacetime nations have sought to harness such technology for commercial purposes. To this end, after World War I, France convened an international aviation conference in Paris. The March 1919 meeting, attended by thirty-eight nations led to negotiation of the Convention Relating to the Regulation of Aerial Navigation.[201] This treaty was the first to enunciate the principle that aircraft, like ships, required a right of innocent passage to be a commercially viable means of transportation.[202]

B. The Chicago Convention and the ICAO

The international commercial aviation industry flourished following the end of World War II. Nations and airlines needed uniformity and predictability for growth of air travel as a viable alternative to travel by rail or sea. International regulation followed the boom in aviation commerce. The Chicago Convention,[203] which entered into force in 1944, was drafted as a compromise between the United States desire for a free market system of aviation and the British desire for an international body to control the industry.[204]

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[201] See generally Salacuse, The Little Prince and the Businessman: Conflicts and Tensions in Public International Air Law, 45 J. Air L. & Com. 807 (1980).

[202] Id.

[203] Chicago Convention, supra at note 1.

[204] Paul Stephen Dempsey, Law & Foreign Policy in International Aviation 10 (1987); See also G. Porter Elliott, Antitrust at 35,000 Feet: The Extraterritorial Application of United States and European Community Competition Law in the Air Transport Sector, 31 G.W. J. Int'l L. & Econ. 185, Troy A.

The Chicago Convention achieves a balance between the United States' and British policy approaches through its famous "five freedoms." The first freedom is the privilege to fly across the territory of another state without landing.[205] The second freedom is the privilege to land in a sovereign nation for non-traffic purposes.[206] Those two privileges are multilaterally extended to all signatories of the Chicago Convention.

The Chicago Convention's third and fourth freedoms are the privileges to conduct traffic, whether passengers or cargo, between (i.e. both to and from) the home nation and another foreign sovereign nation.[207] This was not multilaterally agreed upon by all signatories but instead was the subject a number of separate bilateral agreements between parties to the convention.

Finally, the fifth freedom is the privilege to take traffic (again including passengers, cargo, mail, etc.) between any two contracting states, regardless of the aircraft's home nation.[208] Therefore the Five Freedoms set up a system of basic international privileges, enjoyed by the signatories with respect to each other, that foster international air commerce.

The Chicago Convention also created the ICAO, consisting of an Assembly, a Council and other necessary bodies to develop air navigation principles and techniques.[209] ICAO's aims and objectives were to:

> (a) Insure [sic] the safe and orderly growth of international civil aviation throughout the world;

Rolf, International Noise Certification, 65 J. Air L. & Com. 383, 387 (Spring 2000) (stating, "[P]olitical differences between the United States and many of the allied powers resulted in a document that primarily addressed the technical aspects of international civil aviation and lacked any substance regarding most economic issues").

[205] Chicago Convention, supra note 1.

[206] Id.

[207] Id.

[208] Id.

[209] Chicago Convention, supra note 1 at Articles 43, 44.

(b) Encourage the arts of aircraft design and operation for peaceful purposes;
(c) Encourage the development of airways, airports, and air navigation facilities for international civil aviation;
(d) Meet the needs of the peoples of the world for safe, regular, efficient and economical air transport;
(e) Prevent economic waste caused by unreasonable competition;
(f) Insure [sic] that the rights of contracting States are fully respected and that every contracting State has a fair opportunity to operate international airlines;
(g) Avoid discrimination between contracting States;
(h) Promote safety of flight in international air navigation;
(i) Promote generally the development of all aspects of international civil aeronautics.[210]

Under the terms of the convention, the ICAO was vested with the legal capacity necessary to perform the aforementioned functions.[211] The Assembly meets at least every three years as convened by the Council at a suitable time and place.[212] The Council, as a permanent body, consists of representatives from thirty-three nations elected by the Assembly. The representatives hold their position for three years.[213]

The Council is responsible for most of ICAO's work, such as, submitting reports, establishing the Air Navigation Commission, reporting infractions of the Convention to contracting States, and adopting international standards and recommended practices.[214]

C. ICAO Standard Setting

The ICAO promulgates the standards and recommended practices (SARPS) by adopting technical annexes.[215] Contracting States must voluntarily comply with SARPS

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[210] Chicago Convention, supra note 1 at Art. 44.
[211] Chicago Convention, supra note 1 at Art. 47.
[212] Id. at Art. 48.
[213] Id. at Art. 50.
[214] Id. at Art. 54.

in order to preserve the uniformity and predictability of the Convention. However, in instances where a State departs from the established SARP, the State must immediately inform the ICAO of the differences.[216] This is required whether the deviation occurs because compliance with the standards is impracticable or because the State deems it is necessary to adopt different standards.

Under the convention, the ICAO must adopt international standards and practices in the following international aviation regulatory areas:

> (a) Communication systems and air navigation aids, including ground marking;
> (b) Characteristics of airports and landing areas;
> (c) Rules of the air and air traffic control practices;
> (d) Licensing of operating and mechanical personnel;
> (e) Airworthiness of aircraft;
> (g) Collection and exchange of meteorological information;
> (h) Log books;
> (i) Aeronautical maps and charts;
> (j) Customs and immigration procedures;
> (k) Aircraft in distress and investigations of accidents;
> and other such matters concerned with the safety, regularity, and efficiency of air navigation as may from time to time appear appropriate.[217]

Subpart (e), Airworthiness standards, and the last unnumbered subpart, authorize ICAO to establish SARPs for commercial aircraft noise and emissions. Using this broad interpretation of the authority of articles 37 and 54 and its treaty mandate under the Chicago Convention, the ICAO has set worldwide standards on aircraft noise since 1971 and worldwide standards on aircraft engine emissions since 1981.[218] These standards are found in Annex 16 to the Chicago Convention.

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[215] Id. at Art. 37.
[216] Id. at Art. 38.
[217] Id. at Art. 37.
[218] ICAO, International Standards and Recommended Practices On Environmental Protection, Civil Aviation Convention, Annex 16, Volume I (2d ed. 1988) [noise] and Volume II (March 4, 1988 ed.) [emissions].

As explained above, the ICAO sets the airworthiness standards, but the State where an aircraft is registered is responsible for certifying that such aircraft meets ICAO's airworthiness standards.[219] Contracting states issue airworthiness certificates to document that the aircraft has complied with ICAO minimum standards. States must recognize the validity of properly issued certificates of other contracting states.[220]

To the extent a certified aircraft fails to meet minimum ICAO standards, an endorsement or attachment to the airworthiness certificate must specify the exact details of that failure or noncompliance.[221] An aircraft with such an attachment is banned from international aviation unless the state or states where it operates expressly permit the aircraft to enter.[222] A state may ban from its airspace any aircraft that fails to comply with minimum standards. Thus most states wishing to participate in international air transport comply with ICAO's airworthiness certification process.

In 1983 the ICAO initiated a new unit, the Committee on Aviation Environmental Protection (CAEP), to evaluate the environmental problems caused by the growth of air transport and to make new recommendations about noise and emissions control to the ICAO Council.[223] The CAEP follows an expansive Work Programme that continues ICAO's broad interpretation of its treaty-based regulatory authority.[224]

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[219] Chicago Convention, supra note 1 at Art. 31.
[220] Id. at Art. 33.
[221] Id. at Art. 39.
[222] Id. at Art. 40.
[223] Miller, supra note 64 at 714 (citing R.I.R. Abeyratne, Legal and Regulatory Issues in International Aviation 287 (1996).
[224] See CAEP Work Programme available at <http://www.icao.int/icao/en/env/caepwrkp.htm> visited on Feb. 8, 2001.

D. Annex 16: The Environmental Protection Standards

Just as the United States began to become concerned about controlling aircraft noise through anti-noise regulation in the late 1960s, the ICAO also began having meetings to learn more about the issue.[225] In 1971, ICAO adopted and released Annex 16 under the title of "Environmental Protection."[226] Volume I of the Annex addressed noise controls.[227]

There are three levels of noise control set forth in Annex 16, Volume I. The first level, Chapter 1 denotes those aircraft that are not certified for any noise control at all.[228] Generally speaking, these aircraft were built prior to 1971. These aircraft are also called non-noise certified (NNC) aircraft and very few continue in commercial use due to age and noise problems.[229]

Chapter 2 of Annex 16 sets forth the first true international noise certification. Chapter 2 mostly applies to aircraft built or designed prior to October 6,1977.[230] This paper will only discuss what limits are applicable to subsonic, jet-powered aircraft and will not discuss Chapter 2 rules on rotary wing aircraft.

Chapter 2 of the Annex sets noise limitations for operating aircraft by using three noise measurements. These measurements are taken at different points of the aircraft's

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[225] Jeffrey Goh, Problems of Transnational Regulation: A Case Study of Aircraft Noise Regulation in the European Community, 23 Trans. L. J. 277, 284 (1995)

[226] See Abeyratne, supra note 222 at 242.

[227] Volume II, listing aircraft emission rules, is discussed infra at Section VII.

[228] In the parlance of regulation within the United States, Chapter 1 aircraft are usually referred to as Stage 1 aircraft, Chapter 2 as Stage 2, etc. The terms Chapter and Stage will both be used throughout this paper, depending upon whether the topic is U.S. regulatory control or international parameters.

[229] The United States has banned Stage 1 aircraft since 1985. See 14 C.F.R. Part 91, Subpart I, Operating Noise Limits, Sec. 91-805. Most of Europe has banned Chapter 1 aircraft since 1988, or 1989 for some developing nations' fleets. See Council Directive 83/206/EEC, April 21, 1983, amending Directive 80/51/EEC on the Limitation of Noise from Subsonic Aircraft, 1983 O.J. (L 117) 15.

flight and are referred to as the Lateral Noise Measurement Point, the Flyover Noise Measurement Point and the Approach Noise Measurement Point.[231] Roughly speaking, these measurements represent, respectively, the noise that radiates out laterally from an aircraft taking off, downwards from aircraft as it rises above the runway, and outward from a landing aircraft.[232]

Together, these measurements comprise the aircraft's "noise footprint." Chapter 2 standards do not require the aircraft to strictly comply with the specified limits of each of the three measurements.[233] For example, an aircraft might slightly exceed the Flyover Noise amount if there is some margin of room below the limit on one of the other two measures. Besides this allowance for slight deviations, Chapter 2 also links the size of the permitted noise footprints to the size (gauged in terms of gross weight) of the aircraft.[234]

Chapter 3 of the Annex sets forth requirements for aircraft designed after October 1977.[235] Chapter 3 also allows deviations from the three measurements, but to a smaller degree than Chapter 2. Despite Chapter 3's strictness as compared to Chapter 2, Benedicte Claes points out, "[T]he Chapter 3 standard, which was adopted more than twenty years ago (1977), no longer reflects the latest engine technology."[236]

Overall, Chapter 3 standards are calculated by more sophisticated means than Chapter 2 requirements. For instance, Chapter 3 noise requirements correlate to the

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[230] Chicago Convention, supra note 1 at Annex 16, Volume 1, § 2.1.1.
[231] Chicago Convention, supra note 1 at Annex 16, § 2.3.1.
[232] For a detailed description of how the measurements are taken and how the footprint is calculated, See Rolf, supra note 204 at 393-396.
[233] Id. at 396-397.
[234] Chicago Convention, supra note 1 at Annex 16, Volume I, § 2.4.1(a).
[235] Chicago Convention, supra note 1 at Annex 16 Vol. I, § 3.1.1 (a).
[236] Claes, supra note 88 at 340.

number of engines on the aircraft as well as aircraft weight.[237] In summary, the noise footprint standards for commercial aircraft found in Chapters 2 and 3 vary depending upon the size and configuration of the aircraft.

V. THE HUSHKIT CONTROVERSY BETWEEN THE UNITED STATES AND FIFTEEN EU NATIONS

The ongoing international controversy over hushkits aptly reflects the tensions between regional regulatory and international control of commercial aviation. As one ICAO Council member noted, "This is much bigger than hushkits. It's whether we have an international standard or regional ones."[238]

A. Where Did Hushkits Come From?

In 1990 the ICAO unanimously adopted a resolution to begin a seven year phase out of Chapter 2 aircraft beginning in 1995 and ending in 2002.[239] The ICAO's 1990 decision coincided with the 1990 Airport Noise and Capacity Act that required an even earlier deadline, 1999, to cease operating Stage 2 aircraft (discussed supra at Part III B). Airlines that wanted to continue international operations and enjoy noise certification privileges were faced with a dilemma: either begin to replace the older aircraft (at great

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[237] See generally Rolf, supra note 230 at 397.

[238] Joan M. Feldman, A Primer On Hushkit History and Worldwide Stage 3 and Stage 4 Air Emissions and Noise Standards, Air Transport World, No. 4 Vol. 37 p. 46 (April 1, 2000) (quoting Edward Stimpson, U.S. ICAO Council Delegate)

[239] Aviation and the Environment, Aircraft Noise, available at <http://www.icao.int/icao/en/env/noise.htm>, visited on June 8, 2001.

capital expense) or find a way to make the older aircraft able to meet the noise control requirements set forth in Chapter 3.

Because of the economic slump in the industry of the late 1980's and early 1990's, airlines were reluctant to replace aging aircraft. The FAA gave airlines the option of complying with noise requirements by retrofitting existing aircraft with hushkits. Hushkits are designed to act as a sort of noise muffler so that older aircraft, such as Boeing 727s, 737s and McDonnell–Douglas DC-9s could meet the noise requirements by the U.S.'s 1999 deadline under the ANCA.[240]

Not coincidentally, the hushkit would also limit the aircraft's noise footprint to a degree that would allow the United States to certify that the aircraft met the ICAO's 2002 deadline for Chapter 3 noise compliance.

Once presented with the hushkit option, many airlines chose to modify existing aircraft to meet noise requirements rather than tie up capital by investing in entirely new aircraft.[241] The FAA viewed this as an interim solution since such older hushkitted aircraft would eventually be replaced over time through natural attrition. However, the hushkit solution reflected the reality that airlines were more willing to upgrade obsolete aircraft than purchase new aircraft just to comply with ICAO standards.[242]

At the same time however, European nations and the European Union (EU) began pushing for stricter noise control than was called for in the ICAO Chapter 3 standard. In

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[240] Feldman, supra note 238 at 47.

[241] See generally Dempsey supra, note 9 at 52-53; See also Feldman, supra note 238 at 46.

[242] Maintaining assets well past their normal operating life is frequently an unintended consequence of regulation that assumes that depreciated capital assets will be replaced. See generally Arnold Reitze, Control of Air Pollution From Electric Power Plants, 9-4 (unpublished manuscript) (discussing how the coal powered electric utilities that were built prior to 1971 did not have to comply with expensive New Source Performance Standards, thus encouraging utilities to run inefficient old plant rather than build new facilities. This led to the 1990 Clean Air Act Amendments as an attempt to combat this problem).

1995 the EU urged the ICAO to adopt a Stage 3.5 standard.[243] The United States resisted such a push.[244] The first response of the EU was to announce a directive, to be implemented by national law, which set noise standards based upon engine bypass ratios rather than on engine performance.[245] Bypass ratios are a way of assessing what portion of the total air drawn into an engine is used in the process of fuel combustion as opposed to what portion passes through.[246] After passing the directive basing noise control on bypass ratios, the EU then tried to re-engage the ICAO on the noise issue, asking for regional variances in noise limits.[247] The ICAO did not act on this request.[248]

Thus, in April 1998, the Commission for the European Union began considering a proposal that would require stricter noise regulations.[249] Specifically, the proposed regulation targeted "recertificated" aircraft, namely aircraft which were originally designed to meet Chapter 2 requirements, but which were retrofitted with hushkits, relied on operational restrictions,[250] or had re-engined bypass ratios to meet Chapter 3 requirements.[251] The Council[252] of the European Union adopted the proposed regulation

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243 Rolf, supra, note 204 at 403 (discussing that EU is not a member of the ICAO).

244 Id.

245 Id.

246 The EU believes that a higher bypass ratio both increases fuel efficiency and lowers noise. See e.g., Claes, supra note 88 at 336 (citing M.J.T. Smith, Final Report, Study on the Assessment of the Environmental Performance of Recertified Chapter 3 Aircraft Compared to Aircraft Initially Manufactured to Chapter 3 Standards: Recertified Aircraft and the Environment: An Opinion (April 10, 1999) (unpublished study: on file at the European Commission).

247 Id.

248 Id.

249 The European Commission fulfils the executive or leadership role within the EU. See generally Claes, supra note 88 at footnote 7 (clarifying role of the Commission in the EU infrastructure).

250 Operational restrictions are methods of landing and take-off which minimize the noise impact of the aircraft.

251 See Corrigendum to Council Regulation (EC) No 925/1999 of 29 April 1999 on the Registration and Operation Within the Community of Certain Types of Civil Subsonic Jet Aeroplanes Which Have Been Modified or Recertified as Meeting the standards of Volume I, Part II, Chapter 3 of Annex 16 to the Convention on International Civil Aviation, 3d ed. (July 1993) 1999 O.J. (L 120) 46, Art. 2.2 (hereinafter Regulation).

252 The Council is the EU's legislative body.

on 29 April 1999 [hereinafter the Regulation].[253] Therefore the EU's actions were in direct opposition to the FAA regulation approving hushkits as an acceptable method of achieving Chapter 3 noise control.

The EU Regulation became a "political football."[254] Beyond regional sensibilities, part of the reason for this was the manner in which the Regulation was drafted. The Regulation, originally effective May 1999, had two major sections. First, it prohibited adding any hushkitted/reengined aircraft to EU fleets after the date of the ban. Second, the Regulation also only allowed operation of hushkitted/reengined aircraft that were either registered to EU countries before the date of the ban, or which had regularly scheduled routes to or within EU countries between 1995 and May 2002.[255] In this manner the Regulation prematurely ended the potential useful lifetimes of hushkitted aircraft.

The Regulation, as drafted, would have severe impact upon certain U.S. airlines. For example, Northwest Airlines has a fleet that includes 172 DC-9s, one kind of the aircraft that must be hushkitted/reengined to meet Chapter 3 requirements.[256] Even U.S. airlines that did not operate within the EU were adversely affected; the Regulation had a collateral impact upon the market for used aircraft.

For instance, if a non-EU nation intends to add DC-9s or Boeing 727s to its commercial airlines' fleets to fly within the EU, it may be compelled to purchase aircraft already operating in Europe. Only those aircraft will have been "grandfathered in" to the select group of aircraft exempted from the Regulation. This preference will hurt the

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[253] See Regulation, supra note 251.
[254] See Feldman, supra note 238.
[255] See Regulation, supra note 251 at Art. 3.2; See also Feldman, supra note 238.
[256] Feldman, supra note 238.

market for used U.S. aircraft.[257] The 1990 Regulation therefore doubly harmed the U.S. aviation industry.

There are also two other vocal complaints. The first is due to the fact that most hushkits are manufactured in the United States, hence the Regulation seems to target a U.S. product.[258] Second, U.S. airlines argue that the rule penalizes their lighter aircraft while allowing heavier (noisy) European Airbuses to continue operation because those aircraft meet the bypass ratio rule.[259]

Hence, the Regulation also seems to attempt to prescribe design standards rather than performance standards.[260] The design standards appear to favor European carriers and aircraft manufacturers while disproportionately impacting U.S. carriers and manufacturers.

B. Scholarly Arguments

The five main points of contention between the United States and the fifteen EU nations are:

- Is the EU Regulation compatible with the Chicago Convention?
- Did airlines to hushkit old aircraft only because the FAA required Stage 2 compliance two years ahead of the ICAO phase out?

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[257] Feldman, supra note 238.
[258] Id.
[259] Id. See also Rolf, supra note 204 at 386 (stating, "By banning hushkitted aircraft, the EU may very likely find that air carriers will be forced to operate larger, noisier aircraft in markets that currently may be served by smaller, quieter, hushkitted aircraft").
[260] See Rolf, supra note 204 at 385.

- How much of a financial loss is the EU Regulation actually causing the United States?
- Are hushkitted aircraft actually quieter than some newer and larger aircraft certified as Chapter 3?
- Is the EU Regulation's implementation of a design standard rather than a performance standard in violation of the Agreement on Technical Barriers to Trade (hereinafter TBT Agreement)[261] or any other multilateral trade treaty?

1. Compatibility with the Chicago Convention

Some commentators have supported the EU's approach to Chapter 3. Claes argues that the ICAO sets a minimum regulatory standard. She argues that the contracting states (or regional organizations like the EU) should be free to set more stringent standards -- even mandating design specifications -- if necessary to protect the health and welfare of its citizens.[262] She argues that the ICAO SARPs are not binding on contracting parties; instead the contracting parties may modify or even contradict them at will.[263]

Applying that reasoning to the hushkit controversy, Claes argues that because most hushkitted aircraft barely meet the minimum operating standard of Chapter 3, that they are not adequate substitutes for newer aircraft designed to meet Chapter 3 noise

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[261] Agreement on Technical Barriers to Trade, GATT Doc. MTN/IA II-AIA (Dec. 15, 1993) in Final Act Embodying the Results of the Uruguay Round of Multilateral Trade Negotiations, reprinted in I.L.M. 9 (1994) [hereinafter TBT Agreement]

[262] Claes, supra note 88 at 373.

[263] Claes, supra note 88 at 372.

emission standards.[264] She therefore supports EU's rationale of even stricter regulation for greater improvements in noise control. Inferentially, her balance of trade and environment weighs heavily in favor of a region's right to protect its environment, even at the expense of fair trade.

Of course, a practical fallacy to Claes' argument is that it defeats the entire purpose of the Chicago Convention. If the ICAO were merely a watchdog agency making recommendations on minimum safe levels of noise pollution or air emissions from stationary sources, then her approach would have merit.

However, in contrast, the whole purpose behind the Chapter 3 standards is the ICAO's recognition that aircraft are mobile sources of noise emissions. It is inevitable that there will be variations in performance, including noise emissions, amongst different aircraft, yet there must be some systemized approach for setting limits.

Otherwise, all aircraft would be limited to flights over domestic soil or international waters. Article 33 of the Chicago Convention requires contracting states to recognize each other's airworthiness certificates.[265] Therefore as long as a contracting state certifies its aircraft meets the minimum ICAO requirements, it should not have to meet any additional noise control requirements. Thus the EU Regulation is in violation of the Chicago Convention's essential principle of mutual recognition of airworthiness certificates.

As Rolf correctly summarizes, the EU hushkit policy would require EU member states to discriminate against non-EU aircraft.[266] This is violates Article 15 of the

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[264] Claes, supra note 88 at 352.
[265] See Chicago Convention, supra note 1 at Article 33.
[266] Rolf, supra note 204 at 399.

Chicago Convention, the principle of nondiscrimination.[267] It also creates unfair favoritism of EU aircraft from sovereign nations within the EU community. While Claes argues that this is appropriate given EU's "single market," Rolf notes that this allows the EU to wield undue power in the ICAO where each sovereign nation still enjoys fifteen separate Assembly votes.[268] If the EU can compel those nations to vote in unison, then it wields undue power. Moreover, EU nations also hold six of thirty-three votes in the ICAO Council and seven of sixteen seats on the Committee of Aviation Environmental Protection. Hence, under Claes' approach, EU enjoys the benefits of being treated as a single sovereign for marketing purposes without forfeiting the voting and political power of fifteen separate sovereign nations under the Chicago Convention.

2. FAA's Earlier Phase Out of Chapter 2 Aircraft

As discussed previously, the ANCA calls for phase out of Stage 2 aircraft two years earlier than ICAO's Annex 16. Claes theorizes that U.S. carriers would not have purchased and installed hushkits if the United States had mirrored ICAO's more lenient timeline for Chapter (Stage) 3 compliance.[269] She also argues that the EU will push for Chapter 4 noise control sooner if the hushkit ban is not upheld.[270] Her arguments are politically compelling but they fail to show any legal error on the part of the United States.

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[267] See Chicago Convention, supra note 1 at Art. 15.
[268] Rolf, supra note 204 at 402-03.
[269] Claes, supra note 88 at 348.
[270] Id.

In contrast to the EU's disregard of airworthiness certificates, it is not a violation of the Chicago Convention for a contracting nation to make the certification process for its own aircraft stricter than ICAO requirements. Such an earlier deadline does not impinge other nation's trade; it simply imposes stricter requirements on aircraft registered to the stricter nation. The ICAO functions to set a consistent scheme of minimum requirements internationally applicable, but allows contracting parties to require beyond that scheme for their own aircraft.

Rolf, likewise, notes that the ICAO did not originally intend for Annex 16 to establish operational limitations, but merely certification standards.[271] He acknowledges that later concerns for noise control led the ICAO to develop a compromise which did include operational limits. That compromise, ICAO Assembly Resolution 31-11, Appendix D[272], acknowledges the sovereign nation's power to place operating limitations on aircraft that do not meet Chapter 3 standards. However those operating limits are still clearly linked to ICAO international standards and do not empower one sovereign nation to bind another with unilateral deviations from the convention. The timetables for compliance with Chapter 2 phase out are nonbinding, and that there are no restrictions on aircraft that comply with Chapter 3 noise control.[273]

This is a key distinction between the EU ban on hushkitted aircraft and the United States' early implementation of Chapter (Stage) 3 requirements. Theoretically, a new aircraft could be designed which only meets the same noise control limits as a hushkitted aircraft and still be within Chapter 3. The United States should not be penalized for meeting the minimum ICAO requirements more quickly than the EU. If the EU

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[271] Rolf, supra note 204 at 405.
[272] Originally adopted as ICAO Assembly Resolution 28-3.

questions the adequacy of those minimum requirements, the proper response is to use their numerous votes in the ICAO and persuade the members to implement stricter limitations.

3. Financial Impact of the Losses

Some scholars opine that the EU Regulation does not actually harm U.S. economic interests. Claes poses three reasons why the United States has not suffered genuine economic harm from the EU Regulation's hushkit ban. First, she suggests that very few hushkitted aircraft actually fly internationally between the United States and the EU.[274] Second, she alleges there is minimal impact upon the resale value of U.S. hushkitted aircraft because they are near the end of their useful operational life.[275] Third, she rationalizes that the U.S. carriers will soon update their fleets for normal replacement reasons (lower maintenance and upkeep costs and less time lost to repair).[276] Hence she argues the aviation market's economic realities mitigate the financial impact of the EU Regulation on U.S. interests.

There are flaws in this argument. Claes fails to identify any statistics on the useful operational life of an average Chapter 2 aircraft. In fact the useful life of a commercial jet is usually 25-35 years.[277] Considering that many Chapter/Stage 2 aircraft were built between 1970 and 1989, it is reasonable to assume that some still have 15-20

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[273] Rolf, supra note 204 at 405.
[274] Claes, supra note 88 at 348.
[275] Claes, supra note 88 at 349.
[276] Claes, supra note 88 at 349.
[277] Intergovernmental Panel on Climate Change, Aviation and the Global Atmosphere, Summary Report for Policymakers, approved in detail at a joint session of IPCC Working Groups I and II (San Jose, Costa Rica, April 12-14 1999) (hereinafter IPCC Report).

years of useful commercial life. Claes also ignores the fact that airlines are operated for profit; if it had been economically advantageous to replace hushkitted aircraft with Chapter 3 aircraft, U.S. carriers would have done so rather than resort to hushkits.

Finally, it is important to also recognize that the airlines mostly likely to be hurt by the EU Regulation banning hushkits are those carriers that are new market entrants. New market entrants tend to offer the public lower fares and serve to keep airline ticket prices down throughout the industry.[278] Thus Claes fails to view all of the EU Regulation's financial impacts on the U.S. aviation industry.

4. Noise from Hushkitted Aircraft

Claes also focuses on the technological superiority of new aircraft over hushkitted aircraft. She uses selective scientific data to support her argument that newer aircraft are superior to older, hushkitted aircraft in all areas related to minimizing environmental impacts.[279] Any apparent superiority of newer Chapter 3 aircraft to old hushkitted aircraft, however, is irrelevant. The ICAO chose not to adopt a "Chapter 3.5" standard. The EU should not disregard its Chicago Convention obligations by attempting to impose such a standard unilaterally. Even if such a standard is preferred for environmental or policy reasons, it is not legally supportable.

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[278] See generally Dempsey, supra note 9.
[279] Claes, supra note 88 at 349-359.

5. Performance Versus Design Standards: How Does the EU Regulation Interact with the TBT Agreement and Other Trade Treaties?

a. The TBT Agreement

The TBT Agreement is one of several attachments to the Agreement creating the World Trade Organization (WTO Charter) and was developed during the Uruguay Round of Multilateral Trade Negotiations to further the objectives of GATT 1994.[280] The TBT Agreement attempts to strike a balance between recognizing that states must have the right to take necessary measures to protect human health and environment, but that those protections should not serve to disguise trade barriers.[281] Like other WTO Agreements and its GATT predecessor, the TBT Agreement has a Most-Favored-Nation provision and states a National Treatment Obligation.

To this end, Article 2.1 of the TBT agreement states:

> Members shall ensure that in respect of technical regulations, products imported from the territory of any Member shall be accorded treatment no less favorable than that accorded to like products of national origin and to like products originating in any other country.[282]

Assuming that older hushkitted aircraft and newer Chapter 3 aircraft are "like products," Claes concludes the EU Regulation is consistent with Article 2.1 of the TBT because the EU should be treated as a single nation for trade purposes.[283]

However, it is not textually evident from the TBT that aircraft would be considered "products" under the TBT. Consider that transportation is a service, not a

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[280] See TBT, supra note 261 Preamble.
[281] Id.
[282] TBT, supra note 261 at § 2.2.

product. Hushkitted aircraft are products insofar as the discussion is limited to such used aircraft that could be sold to the EU or third party nations but for the hushkit ban. Under that description, however, the hushkit ban is not consistent with Article 2.1 because the EU Regulation favors aircraft which were registered or operating within the EU prior to the ban over those which operated only in the United States prior to the ban.

Article 2.2 of the TBT Agreement states that:

> Members shall ensure that technical regulations are not prepared, adopted or applied with a view to or with the effect of creating unnecessary obstacles to international trade. For this purpose, technical regulations shall not be more trade restrictive than necessary to fulfill a legitimate objective, taking account of the risks non-fulfillment would create. Such legitimate objectives are, inter alia, national security requirements , the prevention of deceptive practices, protection of human health and safety, animal or plant life health, or the environment. In assessing such risks, relevant elements of consideration are, inter alia, available scientific and technical information, related processing technology or intended end uses of the products (emphasis added).[284]

Here, Claes' argues that the impact of the EU Regulation on U.S. trade is minimal due to the small number of hushkitted aircraft flying international routes or being sold to third countries.[285] Further, she claims that there is no proof of protectionist intent or effect.[286]

Claes' arguments are not convincing for three reason. First, she fails to consider the large number of hushkits manufactured in the United States and the financial impact of losing that business if hushkits were deemed a useless technology.[287] Second, she assumes that many U.S. hushkitted aircraft are unable to fly long distances such as from South Africa to Europe. This assumption is irrelevant because there are potential

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[283] Claes, supra note 88 at 366.
[284] TBT, supra note 261 at § .2.2.
[285] Claes, supra note 88 at 367.
[286] Id. at 368.
[287] See Claes, supra note 88 at 374. Claes argues that the ban affects some European hushkit

purchasers for hushkitted aircraft who are closer to Europe than South Africa. For example, potential purchasers of hushkitted aircraft might include non-EU countries that were formerly part of the Union of Soviet Socialist Republics. Third, she discounts the value of the aircraft despite estimates that the EU Regulation would affect the resale value of 1850 such used U.S. jets, collectively valued at over ten billion dollars.[288]

Most critically, however, Claes fails to consider Article 2.4 of the TBT Agreement. Article 2.4 states:

> Where technical standards are required and relevant international standards exist or their completion is imminent, Members shall use them, or the relevant parts of them, as a basis for their technical regulations except when such international standards or relevant parts would be ineffective or inappropriate means for the fulfillment of the legitimate objectives pursued, for instance because of fundamental climatic or geographical factors or fundamental technical problems.[289]

Clearly, the ICAO standards are a relevant and appropriate international standard that should be applied under the plain language of TBT Art. 2.4. Europe is densely populated, but the EU has not shown that it is suffering from a fundamentally different position than other nations with dense population centers. Nor has it shown that there are any fundamental technical problems with the applicable international standards.

Although she does not show any fundamental technical flaw with ICAO's Chapter 3 standard, Claes argues that the bypass ratio of three is scientifically justified. The European Court of Justice (ECJ) is expected to rule on the scientific justification of the bypass ratio of three as a substitute for the noise footprint noise measurement used by the

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manufacturers, and in her footnote 181 gives the example of Omega Air, an Irish hushkit manufacturer.

[288] Compare Claes supra note 88 at 367 with U.S. Renews Fight Against European Hushkit Ban, Air Wise News, January 20, 2000, available at <http://news.airwise.com/stories/2000/01/948372421.html>, visited Jan. 2, 2001.

[289] TBT, supra note 261 at § 2.4.

ICAO and the rest of the international community.[290] Scientific justification must still be linked to some fundamental reason why the international standard is not viable. Here there is no link.

Similarly, Article 2.8 of the TBT Agreement requires that, "Wherever appropriate, Members shall specify technical regulations based upon product requirements in terms of performance rather than design or descriptive characteristics." The EU Regulation does not conform to this TBT provision. The EU Regulation relies on a design standard when it sets forth its requirements based upon engine bypass ratios rather than actual noise measured from the aircraft. In contrast, the ICAO Chapter 3 requirements are based on a compilation of noise measurements, i.e. the noise footprint (performance) of the aircraft. Therefore even if there were a legitimate technical reason that the EU needed a different standard than the ICAO's international standard, the EU's new standard must be stated in performance terms, not design requirements.

There are policy, as well as legal, reasons to avoid design standards. Rolf observes that requiring a design standard rather than a performance standard "may seriously undermine future technological advances in aircraft and engine design."[291] Design standards limit creative solutions to noise limit requirements because such an approach prescribes a specific technology rather than encouraging new methods.

On the other hand, performance standards set compliance targets that allow industries to find creative technical solutions. Here, Rolf argues that Annex 16 was

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[290] See European Union Rejects ICAO as Forum for Hushkit Dispute, World Airline News, August 18, 2000, Vol. 10, No. 33. See also English Court Rules Against European Union Ban, Airports, Jan. 4, 2000 (both referring to the case of Irish hushkit manufacturer, Omega Air, being referred to the ECJ by the High Court of Justice (England & Wales) (The Queen v. Secretary of State for the Environment, Transport and the Regions, *ex parte*: Omega Air Ltd. Case C-27/00)).

[291] Rolf, supra note 204 at 403.

intended to establish performance standards as a way to stimulate development of newer, quieter aircraft.[292] Rolf asserts that "economics," assumedly market pressures to compete by offering the public newer aircraft with more amenities, and "fleet replacement cycles" will ensure that old noisy aircraft are eventually replaced with newer, quieter aircraft.[293]

Rolf's description of the creative force and market incentives responding to performance standards is accurate, but he is overly reliant on "fleet replacement cycles." As discussed supra in Section I D, experience has proven that airlines will keep older aircraft running as long as possible to avoid implementing expensive new technology.

b. Other Trade Treaties

Although the General Agreement on Trade In Services (hereinafter GATS) includes an aviation annex for Air Transport Services[294], it currently excludes air traffic rights.[295] It only addresses aircraft repair and maintenance, the selling and marketing of air transport services and the computer reservation system.[296]

While the EU Regulation is not currently applicable to such services, if GATS were expanded to include air traffic rights it might help prevent the type of regional protectionism found in the EU Regulation.[297]

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[292] Rolf, supra note 204 at 391.
[293] Rolf, supra note 204 at 392.
[294] The Final Act Embodying the Results of the Uruguay Round of Table Negotiations, Annex 1B: General Agreement on Trade in Services, (April 15, 1994) (33 I. L. M. 1125, 1188) [hereinafter Final Act].
[295] Air traffic rights include, *inter alia*, both the rights to carry passengers and cargo. Id. at 1189.
[296] Final Act, supra note 294 at 1188.
[297] For a detailed discussion of the benefits and detriments of expanding GATS to cover air traffic rights, See Lehner, supra note 37 at 467-471 (Lehner suggests that GATS, as currently drafted, is not an effective multilateral solution to the problems of international aviation; however it could be slightly

c. Hushkits Horizons

The hushkit controversy is not yet resolved. In July 2000, the EU filed preliminary objections, questioning if the ICAO properly had jurisdiction over the case.[298] On 16 November 2000, the ICAO Council rendered a summary decision on the EU's preliminary objections and denied them, accepting the United States' complaint.[299] The decision directed the parties to continue negotiating with the President of the Council acting as conciliator.[300]

The hushkit controversy illustrates the tensions created by trade and environmental pressures. The controversy underscores the need for mutually agreeable, reliable rules for protecting the environment without stifling trade. The ICAO's inability to quickly settle the matter also illustrates the need for a clearly focused dispute settlement process. Such a process is required so that parties may resolve their differences in an efficient manner without lingering litigation. The controversy also highlights how an effective international regime must be recognized as having power and authority to address the inevitable disputes.

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modified slightly to become a successful solution.).

[298] See Settlement of Differences: United States and 15 European States, Preliminary Objections, filed with the ICAO on July 18, 2000.

[299] Id. (Note on Procedure:Preliminary Objections, Subject Nos. 26 & 16, unpublished C-Dec 161/6, Nov. 21, 2000).

[300] Id. at 3.

VI. FUTURE OF NOISE CONTROL

A. Are Chapter 4 Controls Imminent?

Chapter 3 noise control technology is twenty years old. Both the EU and the United States agree upon the need to develop standards for the next level of noise control.[301] The next ICAO Assembly meeting, Session 33, is scheduled for September 25 - October 5, 2001 in Montreal.[302] Noise control is not on the current provisional agenda[303] despite political pressure highlighting noise control issues.[304] This is surprising considering that the CAEP meeting in January 2001 successfully developed a comprehensive series of noise control recommendations for the Council of ICAO to review.[305]

The proposed new noise-level standards include:

- A new noise standard which is 10 decibels lower, on a cumulative basis, than the current Chapter 3 standards in Annex 16 to the Convention on International Civil Aviation [the Chicago Convention], for new aircraft design, effective 1 January 2006
- Procedures for re-certification of existing aircraft meeting the new standard;
- More stringent noise standards for helicopters;
- Publication guidance material on land-use planning;
- A proposal for new take-off noise abatement procedures

The proposed standards reflect a compromise. They show progression towards stricter noise controls in new aircraft design, yet still allow a method to re-certify existing

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[301] See Colin Baker, The Next Chapter, Airline Business, March 2000, at 54; See also Jenkins, supra note 92 at 1054 (calling for the FAA to establish Stage 4 noise limits as long ago as 1994, as well as a long-term plan to deal with airport noise control over the next twenty to thirty years).

[302] See <http://www.icao.org> (home page); visited Jul. 18, 2001.

[303] See <http://www.icao.org/cgi/a33.pl?ai;>, visited Jul. 18, 2001.

[304] See Baker, supra note 301 at 54.

[305] See Aviation and Environmental Experts Recommend Stricter Noise Standards and Emissions Procedures, available at <http://www.icao.int/icao/en/nr/pio200101.htm>, visited Jul. 18, 2001.

aircraft. CAEP has offered a viable compromise for Council, and ultimately, Assembly consideration.

B. Who Will Develop the Technology?

Many scholars argue there should be more investment in noise control technology. Falzone suggests that a new agency, separate from the FAA, take the reins of developing new technology.[306] She argues that the air carrier lobby overly influences the FAA. The FAA also cannot deal with noise control effectively because of overwhelming concerns of safety and air traffic control.[307] Professor Dempsey suggests that better technology will develop only if regulations act as a driving force, but there are no such technology-forcing regulations currently in place.[308]

Although it cannot take the place of Falzone's new agency, ironically, perhaps the military may provide some of this technological support. For example, as discussed in Section III D of this paper, the military is developing new low-noise reconnaissance aircraft.[309] Often times military technology has civilian use.

C. New Technology Will Mean Nothing Without Land Use Controls

One problem inherent in the noise controversy is that controlling the noise of individual aircraft is only controlling part of the aviation noise equation. Evaluating total

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[306] Falzone, supra note 79 at 802.
[307] Id. at 803
[308] Dempsey, supra note 58 at 658.
[309] See Bender, supra note 162.

noise exposure must include innovative land use controls. In some ways there is an analogy between the United States' struggles with the federal preemption doctrine as it relates to local land use and the international noise disputes. In each instance a delicate balance must be struck between local environmental interests and the outside interests of commerce.

In both scenarios, the locals stand to gain some economic benefit from being near a financially viable, well-run airport. Trade improves for the computer company near Dulles; cheaper tickets are available for the consumer departing a European airport on a hushkitted aircraft. But with either analogy, federalism or globalism, the local citizens must realize "in for the penny is in for the pound." They cannot expect to reap the benefits of being part of system of mutual responsibilities and obligations and then unilaterally change the bargain. Land use controls require that the municipalities around airports exert some self-discipline in exchange for the benefits of having an airport nearby.

VII. NO_X CONTROL AND GREENHOUSE GAS ISSUES

Paradoxically, technological improvements that improve noise control from aircraft jet engines may increase their emissions of greenhouse gases[310] and other pollutants.[311] As noted earlier, air transport is growing at a rapid rate.

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[310] Greenhouse gases are the atmospheric gases that trap heat in the atmosphere, and thereby cause a warming of the earth. This naturally-occurring phenomena can be accelerated by human use of fossil fuels, removing (especially by burning) forests, and use of certain chemicals, particularly chloroflourocarbons (CFCs). Both CO_2 and NO_x aircraft engine emissions can contribute to this effect.

[311] Dempsey, supra note 58 at 659 (citing Paul Page, Airlines Blast EPA on Engine Standards, J. of Comm. 39 (1995); Paul Page, Airlines, Environmental Regulators In Talks Over Plan To Change Jet Engine Oversight, J. of Comm. 19 (1995); Martin Noble, A Volcano That May or May Not Erupt,

The GAO reports that aviation emissions account for about 3% of the total greenhouse gases but that this number is likely to rise as air travel increases worldwide.[312] The report notes that aviation emissions are significant because the jet aircraft emissions discharge directly to the upper atmosphere.[313] Additionally, aircraft CO_2 may linger in the atmosphere for up to 100 years, and when combined with other jet engine emissions, may have two to four times the impact of CO_2 alone.[314]

Commercial aircraft comprise seventy percent of the NO_x emissions from the total aircraft sector.[315] In fact, aircraft are the only source of NO_x in the upper atmosphere and contribute a much greater percentage of CO_2 for distance traveled on a person by person basis than any other form of mass transit.[316] However, scientific uncertainty still haunts researchers.[317] Nonetheless, the lack of scientific consensus as to the exact quantity of aviation emissions, does not detract from the general consensus that commercial aircraft detrimentally affect the environment.[318]

When compared to other commercial transit (commonly called mobile sources), there is minimal regulation of aircraft engine emissions. For example, the EPA continues to impose even stricter requirements on automobiles, even though that industry has managed to reduce emissions ninety-eight percent per vehicle over the past 25 years.[319]

Interavia Bus. & Tech. Jan. 1, 1999, at 19.

312 See <http:///www.denix.osd.mil/denix/DOD/News/Pubs/DER/23Feb00/30.doc.html>, visited Jan. 3, 2001 (referencing GAO report No. GAO/RCED-00-57; available at <http://www.gao.gov>).

313 Id.

314 Id.

315 EPA, Evaluation of Air Pollutant Emissions from Subsonic Commercial Jet Aircraft, EPA 420-R-99 -013, April 1999, at 1-1 (hereinafter EPA Evaluation).

316 Dempsey, supra note 58 at 653.

317 See, e.g., Richard Monatersky, Ten Thousand Cloud Makers, Science News Online, available at <http://www.science news.org/sn_arch/7_6_96/bob1.htm>, visited Dec. 30, 2000.

318 See generally Miller, supra note 64 at 699-704 (discussing greenhouse gases and the Kyoto Protocol).

319 EPA Evaluation, supra note 315 at 1-3.

Locomotive emissions, which were unregulated until the year 2000, must now reduce NO_x emissions by sixty-six percent starting in 2005.[320]

In contrast, the EPA's rule for commercial aircraft engine emissions only requires U.S. manufacturers meet the ICAO's already well-established standard.[321] The EPA states that it is very important to support the ICAO's latest sixteen percent reduction in NO_x emissions and "advocate other aircraft emissions control programs."[322]

While some industry groups minimize aircraft emissions' impact on the global atmosphere,[323] other industry groups have embraced enhanced regulation of emissions, particularly through a harmonized international regime.[324] Concern about the impact of aviation on global greenhouse emissions has grown to a degree that The United Nations Intergovernmental Panel on Climate Change (hereinafter IPCC) issued a summary report for policymakers outlining the problem and potential options in response.[325]

The IPCC report recommends four options to reduce emissions and impacts – aircraft and engine technology improvements, fuel changes, operational changes and regulatory/economic changes.[326] The IPCC predicts that technological advancements could result in a forty to fifty percent improvement in fuel efficiency by the year 2050, but that implementing such technology in new aircraft may take even more time to

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320 Id.

321 See Final and Proposed Rule, Control of Air Pollution from Aircraft and Aircraft Engines; Emission Standards and Test Procedures, Federal Register Vol. 62, Number 89, May 8, 1997, at 25359, modifying 40 C.F.R. Part 87.

322 EPA Evaluation, supra note 315 at 1-3.

323 See, e.g., International Air Transport Association, Air Transport Action Group, Air Transport and the Environment, available at <http://www.atag.org/atenv>, visited Jan. 2, 2001.

324 Glyn Roundtree & Howard Aylesworth, Support Realistic Aerospace Environmental Regulations, AIA News – AIA Update, Oct. 1998, available at <http://www.aia-aerospace.org/aianews/aiaupdate/u-oct98.cfm>, visited March 8, 2001.

325 See IPCC Report, supra note 277.

326 Id. at 10-11.

implement.[327] In the interim, smaller improvements may be achieved by changing fuels and operational practices.

As a final matter, however, the IPCC anticipates that these improvements will not match the rate of growth in the airline industry. The IPCC recognizes that most policy options to further reduce emissions, e.g. environmental levies, emissions trading, and the removal of subsidies that have negative environmental consequences, will likely result in higher aviation costs and higher ticket prices.[328] Hence higher costs for either the consumer or the aviation industry are only way to adjust the balance of trade and environment to better prevent global warming.

The recent CAEP report recommended the following developments in aircraft engine emissions control:

- Further development of the elements necessary for an emissions trading programme for international aviation emissions, consistent with the Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCC), which recognizes ICAO as the global instrument for industrialized countries to pursue the limitation or reduction of greenhouse gas emissions from international aviation;
- Additional work on voluntary mechanisms and the possible use of charges to address emissions;
- Including in the Global Air Navigation Plan a methodology for analysing the environmental benefits of implementing communications, navigation, surveillance and air traffic management (CNS/ATM) systems. This methodology is based on a model used in the United States and Europe which demonstrated overall fuel savings, and associated reductions in CO_2, of some 5%;
- Publication of an ICAO Circular on Operational Opportunities to Minimize Fuel Use and Reduce Emissions, containing the best industry practices for minimizing fuel consumption.[329]

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[327] Id.

[328] Id.

[329] See Aviation and Environmental Experts Recommend Stricter Noise Standards and Emissions Procedures, available at <http://www.icao.int/icao/en/nr/pio200101.htm>, visited July 18, 2001.

Each of these proposals will require significant investment into the technology and infrastructure of aviation. The question is who will pay, industry, government, the public or a combination thereof? Spokeswoman for the EU Parliament's Environment Committee, British Deputy Caroline Lucas, states that despite a "litany of environmental problems," aviation is "massively subsidized" and has been "getting away without paying their way for over 50 years."[330] This is in marked contrast to many airlines' claims of near bankruptcy discussed in Part I D of this paper.

VIII. DESIRED FEATURES IN INSTITUTIONS OF GLOBAL ENVIRONMENTAL GOVERNANCE

Scholars have wrestled with what features should be incorporated in institutions responsible for global environmental governance. One of the major points of debate is if there should be institutions empowered to set transnational standards. Traditionally sovereign nations only had to comply with standards to which it expressly agrees by treaty or which were so established by custom and precedent that they were accepted as de facto international law. Treaty making is a cumbersome, lengthy process and international custom is not a reliable source of precedent. Institutions setting transnational standards would solve both of these problems.

As noted by Peter Sand, "Bypassing ratification means bypassing traditional parliamentary controls".[331] Sand offers several alternatives to serve as a check or balance against this perceived threat to democracy. One possible solution would be to create a

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[330] BNA Reporter, supra note 51 at 701.
[331] Peter Sand, Lessons Learned in Global Environmental Governance, 18 Boston College Env. Aff. L.

parliamentary style organization above the level of national governments, an example of which is the European Parliament's Environment Committee.[332]

If a sort of "supernational" parliament is used, then there are two possible ways national endorsement of international standards might be met (without the delays and politicking of full ratification).[333] One way to accomplish this is to require nations to affirmatively accept the standards adopted by the international institution.[334] The second option is to allow nations to "opt out". In other words, make the international standards binding unless a nation takes affirmative action to disavow the standard.[335] This is the method used by the ICAO in developing technical standards.[336]

This is the process, however, by which the bilateral treaties such as Bermuda I, discussed supra in section I E, divided up the rights to aviation routes. The question is whether this is the method to fly into the future. The U.S. policy of Open Skies has attempted to open the door to multilateral route negotiations. However, multilateralism requires that states sacrifice a large amount of flexibility in their decision making and it requires a commitment to long term goals while forgoing short-term gains.[337]

Sir Geoffrey Palmer has likewise observed that there is an institutional gap between those global organizations that formulate policy and the haphazard, disorganized approach taken to establishing rules for global environmental security.[338] He criticizes the United Nations Environmental Programme (UNEP) as lacking the formal authority or

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Rev. 213 (Winter 1991).

[332] Id.

[333] Id.

[334] Id.

[335] Id.

[336] See Chicago Convention, supra note 1.

[337] Lisa L. Martin, Interests, Power, Multilateralism, International Institutions, An International Organizations Reader 40 (MIT ed. 2001).

[338] Geoffrey Palmer, 86 A.J.I.L. 259 (1992).

enforcement powers necessary to push states into compliance with environmental policies.[339]

Sir Palmer sees UNEP's reliance on "soft law" instruments and framework conventions as a weakness to be fortified by creating a proper international agency within the United Nations system that has real power and authority.[340] He argues that it is inefficient to create a new treaty framework and separate negotiations for each area of environmental concern that arises.[341] He proposes instead a central "institutional home" for the conduct of negotiations.[342] He finds the requirement of unanimous consent a huge obstacle to progress and suggests that the world needs a global legislature that has access to high quality scientific information and has the powers of monitoring, assessment and enforcement.[343]

Sir Palmer believes that there are four options to evaluate when considering institutions of global governance. First, he posits that we could retain the haphazard status quo. Second he considers that UNEP could be strengthened and given formal responsibilities. Third, he notes that the power and functions of the Secretariat could be embellished to meet the growing need for environmental control. Finally fourth, he finds that an entirely new international institution could be established.[344] Sir Palmer prefers an entirely new institution.[345]

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339 Id. at 260.

340 Id. at 262 (by "soft law" Sir Palmer explains, at 269, that he is referring to the politically convenient approach to international law whereby nations express a series of political statements or values, rather than resort to treaties or custom -- which are hard, enforceable rules, either by long-standing practice or express agreement).

341 Id. at 263.

342 Id. at 264.

343 Id. at 264.

344 Id. at 279.

345 Id. at 280.

Ironically, the ICAO operates in a way that meets many of Sir Palmer's requirements. It does not require a unanimous vote, so it is freer to move forward with decisions. In the case of the ICAO, binding rules may be made by a two thirds of the majority of the representative body.[346] It also has access to high quality scientific information. The ICAO's committees are able to engage groups of experts to provide the latest studies. For example, the Committee on Aviation Environmental Protection (CAEP) has utilized a group of experts to examine the issue of noise standards beyond Chapter 3 control.[347]

Runge offers four principles that should be incorporated when drafting instruments that will both encourage free trade and protect the environment. They are:

- Principle 1: In general, trade targets should be matched with trade instruments and environmental targets with environmental instruments.
- Principle 2: In general, trade policies should aim to reduce trade barriers while remaining environmentally neutral.
- Principle 3: In general, environmental policies should aim to conserve natural resources and improve the quality of the ecosystem while remaining trade-neutral.
- Principle 4: National governments should be encouraged to pursue similar trade and environmental policy objectives. [348]

These principles are meant to remedy the international trading system and national economic policies, which Runge asserts have fallen short of protecting the environment. He attributes this failure to a refusal to give environmental concerns the priority they deserve.[349]

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[346] Chicago Convention, supra note 1 at Arts. 54, 90 (setting forth the adoption of Annexes, namely international standards and recommended practices, as one of the mandatory functions of the Council -- Art. 90 requiring Annexes to be adopted by at least a two-thirds majority vote.

[347] See Baker, supra note 301.

[348] C. Ford Runge, Freer Trade, Protected Environment, Balancing Trade Liberalization and Environmental Interests 29-30 (1994).

[349] Id. at 31.

Finally, any preferred international regime, however, must incorporate an effective dispute settlement regime. The ICAO's slow handling of the hushkit controversy and failure to have a clear dispute resolution mechanism is apparent. Negotiators to any new dispute settlement regime must articulate at the outset what degree of deference the international institution shall give national decisions about trade or environment regulations alleged to be inconsistent with an international rule.[350]

IX. PROPOSALS FOR NEW AVIATION TREATIES

Any new treaty for controlling aviation noise pollution and emissions and settling the trade disputes that will inevitably arise from those controls, must first reach a consensus on three key areas: trade policy, social change and the role of aviation in national defense. Until these issues can be agreed upon, the legal control of noise and emission pollution from commercial aircraft will continue to be a morass of disparate standards susceptible to nationalistic interpretations and agendas.

A. Trade Policy

Dempsey argues that the economics of international commerce, for example, flying a shirt made in Korea to North Carolina, causes two harms – uncompensated

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[350] See, e.g., Steven P. Croley and John H. Jackson, WTO Dispute Procedures, Standard of Review, And Deference to National Governments, The American Journal of International Law, Vol. 90, p. 193, 194 (1996) (discussing the WTO's formal review procedures and comparing and contrasting it to United States review of cases arising under the Administrative Procedure Act.).

environmental damage and a loss of jobs for skilled labor in the United States.[351] He argues that the United States should impose tariffs against environmentally irresponsible nations.[352] Yet, from our previous discussion, such a tariff would be as unilateral and unsupportable as the EU hushkit ban. It would also contradict the national policy of pushing for trade expansion across the globe and would likely violate GATT. One might even argue that expanding trade relations is a form of protecting national security interests by developing economic ties with nations.

B. Social Change

We must also consider to what degree a new treaty regime would be used to foster social change. As already discussed, aviation is a growth industry. Yet air travel is very inefficient for flights under 500 miles. Dempsey believes that such inefficiencies may be corrected through social change and reform.[353] For instance, providing clean comfortable and faster rail service might be an incentive for social change.

How do you implement social change in the face of the protectionist policies in many nations and many individual's strong motivation not to pay higher travel costs? This can only be accomplished if there is an end to subsidized fuel and protectionist policies that allow airlines to operate without reflecting the full cost of their operation in the ticket price. Therefore social change must first be predicated by political change such as dismantling protectionist policies and promoting competitive alternatives to inefficient sectors of airline operations.

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[351] Dempsey, supra note 58 at 685.
[352] Id.

C. National Security

The U.S. Congress has partly justified federal preemption of local aviation regulation because of the important role aviation plays in national defense.[354] National defense includes both economic and military security.[355] Hence politicians are reluctant to take any action that might be viewed as crippling the commercial airlines' support role as the Civil Reserve Air Fleet.

Likewise, environmental issues may also impact on national security.[356] German Foreign Minister Fischer, speaking at a conference in February 2000, noted the future possibility of trade conflict between the United States and Europe, mentioning disputes over genetically modified food, subsidy rules or noise-reducing aircraft equipment.[357]

Lehner proposes that nations have been hiding behind the mantle of "national security" in order to maintain protectionist aviation policies.[358] Lehner analogizes the airline industry's arguments to those previously expressed by the steel industry because both industries claim they play a special role in national security.

Lehner points out that the lobbyists for the airline industry and legislators expressed resistance to being airlines being made subject to the requirements of GATS.

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[353] Id. at 655.

[354] Field, supra note 121 at 333 (citing legislative history of the 1958 Federal Aviation Act, which expressly recognized the role of national defense, and citing the remarks of President William J. Clinton, who, upon signing House Bill 904, stated that aviation is important to the national economy and to national defense).

[355] Id.

[356] Interestingly, despite all of the political backpedaling President George W. Bush has done regarding the Kyoto Protocol, it is one environmental agreement that was believed not to have a negative impact on the national security of the United States. See, e.g. , Talking Paper on Climate Change and National Security, available at <https://www.denix.osd.mil/denix/Public/News/OSD/Climate/talkpts.html>, visited March 11, 2001.

[357] NATO Public Affairs, Defence and Security for the 21st Century, available at <http://www.atalink.co.uk/nato/html/p051.htm>, visited on March 8, 2001.

[358] Lehner, supra note 37 at 448-449.

Those lobbyists and legislators saw GATS as disincentive for U.S. airlines to maintain the size and flexibility that national defense might require.[359] However, Lehner argues that such policies are inefficient and ultimately cost the United States economically by protecting the less competitive airlines of foreign nations.[360] He notes that most U.S. airlines are better able to withstand competition than airlines registered in protectionist nations.

Schless concurs with Lehner that a GATT/GATS type of policy for aviation services is inevitable and beneficial.[361] He also theorizes that:

> Open Skies and Foreign ownership should not affect national security. The U.S. Government can retain the Civil Reserve Aviation Fleet (CRAF) through agreements and legal contracts with the airlines. The CRAF was vital to the allied efforts in the Gulf war by shuttling thousands of troops to Saudi Arabia. The United States can retain control of approvals for all joint ventures by promulgating rules requiring aircraft registered under the laws of the United States to be available in times of crisis.[362]

The real problem is that the United States has not yet formulated a cohesive and coherent policy stating to what degree the nation is willing to relate the economic state of the aviation industry to national defense. Lehner's approach simply assumes that national defense can be separated from the nation's economic health. Economic differences may often fuel the sense of inequities that can rile nationalism and spur a country into war, whether in trade or with weapons[363]. Saddam Hussein invaded Kuwait for economic reasons as well as political. U.S. military forces deployed to Kuwait to

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[359] Id. at 450-451.
[360] Id.
[361] Schless, supra note 28 at 465-466.
[362] Id. at 469.
[363] For example, the economic sanctions of the Allied following World war I caused World War II. The severe economic sanctions of the Treaty of Versailles helped fuel Hitler's rise and German super -Nationalism, that in turn led to the outbreak of World War II in 1939.

protect strategic national interests in Kuwait's oil reserves there, an economic reason as well as political.

Schless fails to consider what would happen if a former ally jointly owning a U.S. airline is no longer an ally. Hence, there are still some reasons to maintain independent national airlines.

Only when the United States has articulated clear goals for trade policy, social change and national security will it be able to negotiate an amendment to the Chicago Convention that balances the interests of environmental protection and trade rights. However, like the local citizens in municipalities around U.S. airports, once a regime is struck, as a global citizen, the United States must recognize that some local power is relinquished for the sake of long term goals.

X. CONCLUSION

So where do environmental protection and free trade balance for the commercial airline industry? The answer is not amenable to an easy solution. However, this paper has discussed the difficulties inherent in articulating effective norms and standards of regulating aircraft noise and emission pollution. It has shown that the natural conflicts between local interests and federal interests lead to frequent legislation that still has failed to adequately balance the needs of landowners and airport proprietors.

Such conflicts are mirrored in the global marketplace. The problems discussed relating to the current ICAO regime for controlling commercial aviation noise and emissions pollution are:

1) An archaic structure that emphasizes sovereign rights and cabotage and has consequently led to a confusing array of bilateral agreements and protectionist policies;
2) A conflicting mission that directs the ICAO to both promote aviation and control aviation; and
3) An insufficient mandate to effectively address international trade issues or settle trade disputes.

On the other hand, the ICAO has been an exemplary institution of how an international regime can be used to solidify standards like international aviation safety and navigation standardization. Without those standards, aviation would never have been able to grow to today's behemoth proportions.

An amendment to the Chicago Convention would solve the problems without risking the loss of the benefits above. The changes should incorporate more specific language empowering the ICAO to address environmental and trade issues head on. It should incorporate core GATT principles of free trade and promote technological development by encouraging performance standards rather than design standards. It should establish a comprehensive procedure for dispute settlement. When these changes are implemented, the ICAO will the be able to maintain the delicate and difficult balance required to protect the environment and promote the trade of international commercial aviation.